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Abstract

China's shift in energy policies has been broader, deeper and more successful than that of most other emerging economies, although the economic costs of this transition are tremendous because China is an over-industrialized country whose production is highly energy-intense and it depends on emission-intensive coal as main energy source. Factors that have influenced energy reforms, which focus on saving and conserving energy, developing renewable sources and nuclear power, are – on the international level – the impact of climate change on India, the desire to be recognized as a responsible power in the international community, China's dangerously growing dependence on energy imports, and the uncertain prospects of equity oil abroad for energy security. Domestic factors are the growing assertiveness of environmental NGOs, relatively effective sectorial governance, and the embedding of energy policies in a blueprint for industrial upgrading.

Keywords: energy policy, climate change, energy institutions, international climate summits, political system, civil society

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Joachim Betz

Article Outline

1 Introduction

China's energy policies, at least as far as the country's official proclamations have defined them, are in a state of rapid flux. Whereas in former times self-reliance at any cost was the foremost energy policy goal pursued, increasing efficiency, saving energy, diversifying sources of conventional energy (fossil fuels), and rapidly developing renewable energies have recently come – at least verbally – to the forefront (National People's Congress 2011; State Council of the PRC 2007). China's energy agenda does not differ greatly from those of other emerging economies undergoing rapid growth, with its still-considerable areas of poverty and with its heavy reliance on coal as the primary energy source. However, the shifts underway in energy policy are more all-encompassing in China than they are elsewhere: nearly every subfield is covered, the links between energy policy and climate change have

been made more explicit and, most importantly, the policy adjustments are being pursued with greater vigor, if we use the planned reduction of the energy intensity of production as a yardstick. Furthermore, as far as judgment from outside allows, these changes can be said to be producing more success than they are in competitor countries – particularly among the other regional powers like India, Brazil and South Africa (IBSA).

This vigor and success both in saving energy and developing renewable resources nevertheless has to be seen against the backdrop of China's past and planned rapid economic growth, the massive share of cheap – but highly polluting – coal in its energy mix, the dominance of public-sector enterprises in the generation and distribution of energy, and the growing but still moderate demands of civil society in China for a change in the direction of energy and climate policies. Some of these circumstances could likely make a shift in China's energy strategy both costly and politically rather difficult, although the near absence of domestic political veto powers within an authoritative system such as this one might be of some benefit. Comparative studies also assume that powerful countries have less incentive to change tack in climate-related policies than smaller ones do, especially if they are not directly and severely affected by climate change (as island nations are). Furthermore, scholars posit that, in general, democratic countries are more likely to contribute to global public goods – particularly as they are prone to come under popular pressure to do so (Bättig and Bernauer 2009).

Actions to mitigate climate change and to save energy would fall precisely within this domain. In addition, international (energy-related) institutions able to influence Chinese policies in these realms are currently either weak or entirely non-existent (Rittberger et al. 2011; Michaelowa and Michaelowa 2012), more so given that developed countries – most prominently the United States – have remained detached from any internationally binding commitments to reduce energy consumption. China, as the most powerful state among the emerging economies, therefore has less reason to bow down to American pressure than its peers do. In the face of these obstacles to (and poor incentives for) creating an environmentally friendly energy policy, energy saving and the development of renewable resources, China's ambitious reduction targets during the lifetimes of the 11th and 12th Five-Year Plans and, more so, the achievement thus far of most energy-related targets set hence needs to be explained. The few efforts that have been made to offer insights into these circumstances have centered around:

a) the peer pressure exerted by other developing countries or established powers;
b) the calculations made regarding the likely costs of pursuing traditional energy policies on future economic well-being (such as a fall in agricultural output and further rises in the sea level); and
c) the perceived improvement of energy security to be achieved by switching to energy-saving measures and clean energy sources.

Domestic political factors have only rarely been discussed in the equation; to date there has only been one comparative study (a rather short one, at that) that has integrated all of the

possible channels influencing these energy policy outcomes (Rong 2012). Although this may be more easily demanded than delivered, this paper will attempt to do just that. To this end, an overview of China's energy sector is needed first, thus building a basis from which to assess the degree of difficulty of pursuing a more climate-friendly, energy-saving economic strategy. Next, domestic, regional and global energy strategies put in place over the course of the last decade have to be analyzed along with their outcomes before an attempt can be made both to collate the factors explaining the shifts in energy policy and to evaluate their relative success.

2 Domestic Strategies

2.1 The Present State of China's Energy Sector

Coal is the source of the vast majority of China's energy consumption today: 67 percent. Oil is the second largest source (17 percent), followed by biomass and waste (9 percent), hydropower (3 percent), natural gas (3 percent) and nuclear power (1 percent). Other renewable sources account for only 0.2 percent of the energy consumed in China. With regard to power generation, the dominance of coal is even more pronounced (89 percent) – followed by hydropower in a distant second place (just 6 percent). According to the estimates of the International Energy Agency (IEA) (2011), the preponderance of coal in the energy mix will only slightly decline in a business-as-usual scenario continuing until 2035 (60 percent). Even if all new energy-related programs are successively executed, the share of coal will fall only to 51 percent (in terms of power production to 64 percent). The dominance of coal is not surprising given that China is by far the world's largest producer of the commodity, and that it owns about 14 percent of the world's reserves of coal. Part of the coal that China produces has a high sulfur and ash content, and is therefore unsuitable for many of the typical applications. Reserves of high-quality coking coal, used for steelmaking, are scarce. Moreover, with the increasing need to extend the depth to which they mine, it is becoming ever more difficult and costly for China to exploit its coal reserves. The production efficiency of China's coal mines is rather low; the recovery rate for coal reserves is only 30 to 35 percent, far less than best practice (meaning, more than 50 percent). Another problem with coal mining in China is the fact that demand is strongest in the coastal regions, whereas supply remains concentrated in the western and northern provinces. In other words, the transportation of coal over several thousand kilometers is a challenge for China's generation of power.

Aside from the constraints of geography, also significant is the fact that the major areas of coal mining are highly vulnerable to environmental degradation on account of their arid climates. Being poorly developed in comparison to the coastal regions, China's western and northern provinces also lack the means to cope with the environmental impact of such mining. These problems, together with shrinking coal resources and China's goal of reducing the

carbon intensity of its production, mean that China plans to considerably reduce the percentage of coal used in overall energy consumption. This would, nonetheless, cause an increase in coal production by more than 50 percent by 2035, because of the country's robust growth (Sun 2010; IEA 2011). Having for a long time been a coal exporter, since 2002 China has had to import coal because of the cost and quality advantages compared to the domestic mining of coal. The average cost of production increased sharply after 2000, in spite of swift productivity gains. The main causes of this price hike were worsening geological conditions, new levies and taxes introduced to reduce the environmental impact of mining, transport bottlenecks and the massive restructuring of the industry – whereby inefficient mines were closed down (IEA 2011: 425). Imports climbed rapidly, making China the world's second-largest coal importer by 2010 (after Japan). The amount of imported coal used has nevertheless remained modest, coming mostly from Australia and Indonesia (Energy Information Administration, EIA 2011) – meaning that interruptions in the supply chain are rather unlikely. Nonetheless, the Chinese government has launched schemes to improve the freight transportation systems for domestic coal, to increase the production capacity of coal mines (in Inner Mongolia) and to switch to trading with partners from which coal can be imported overland (i.e. Mongolia).

With regards to oil, the level of demand is far outstripping that of domestic production. China has had, therefore, to import an increasing amount of the oil that it consumes. The share of imported oil rose to 53 percent in 2009, making the People's Republic the second-largest net oil importer worldwide after the United States. This share will increase to 84 percent according to the projections of the IEA (2010; EIA 2010b). Over 50 percent of China's oil imports currently come from Middle Eastern countries, although African countries also contribute a significant amount (30 percent). In 2010 Saudi Arabia and Angola were China's two largest external sources of oil (accounting for 19 and 16 percent of oil imports in 2010 respectively), followed by Iran, Oman, Russia, Sudan and Iraq (Jian 2011). The EIA predicts that China will be importing about 72 percent of its crude oil by 2035, which would constitute a significant rise from the current amount of 50 percent (EIA 2011).

Although natural gas is not a major source of energy in China, its share in energy consumption is on the rise. In 2007 the country became, for the first time, a natural gas importer. The government intends to boost the amount of gas used in overall energy consumption to alleviate pollution from the heavy use of coal. To meet the growing shortfall in supplies, it is expected that China will increase imports in the form of liquefied natural gas (LNG); it is also considering the construction of a number of pipelines with neighboring countries (EIA 2010b).

The heavy dependence on imports of energy-related resources does not mean that China lacks the domestic capacity to generate power, particularly electricity. China is the world's largest producer of hydroelectric power, which contributes 16 percent to its total electricity generation. Production will further increase now that, since 2012, the construction of the

Three Gorges Dam, as well as of other hydropower projects, is fully complete. China is also actively promoting nuclear power as a source of electricity generation, although it makes up only a very small percentage of generating capacity at present – a fraction that will increase threefold (to 6 percent) by 2035. In 2011, 13 reactors were in operation – while an additional 27 reactors were either under construction or in the planning stages (EIA 2011b).

Wind is the second leading source of renewable energy used for power generation, with China already being the world's fifth-largest wind producer. Installed capacity has been doubling every year since 2005. However, the lack of an adequate infrastructure for the subsequent transmission of the power generated has left a considerable part of that capacity currently unusable.

Regarding demand by sector, China is a special case as around half of all energy consumed is absorbed by the industrial sector – a far greater percentage than in India or the industrialized countries. The reasons that industry plays such a dominant role in the Chinese economy are multifold: China produces almost all goods that it is possible to manufacture – a consequence of many decades of self-sufficient and import-substituting industrialization. Furthermore, the People's Republic has become the "workbench" of the world, partly replacing the low and medium capital and skill-intensive means of production of the developed countries. A large fraction of China's energy consumption and carbon emissions can, therefore, be attributed to international trade, especially as imports are less energy- and carbon-intensive than exports are (Halldang et al. 2009) – and the former have, in addition, on average a rather low added value. As China's economy develops towards higher value-added and more sophisticated exports, this gap will certainly narrow. Finally, the Chinese government has been supporting the country's capital- and energy-intensive industrial sector with public credit, cheap land and infrastructural services, and has facilitated the export drive by the considerable undervaluation of the currency (Rosen and Houser 2007).

The building sector was responsible for over 18 percent of China's energy use by 2008, and is still growing rapidly. The energy consumed by new buildings was a major cause of this increase, although energy intensity – that is, the energy used per square meter – also contributed equally to this hike. Both of these factors can be attributed to rising standards of living and rapid urbanization (Climate Policy Initiative 2011). Compared to the energy consumption of the secondary sector, the amount used for transport is still moderate – accounting for about 12 percent of all energy consumed in China. However the country's vehicle market has grown sharply in the past two decades, far in excess of earlier forecasts. Annual sales have shot up from 1.4 million vehicles in 1994 to 18 million in 2010, making China the largest vehicle market in the world at this point in time. Passenger cars accounted for most of this increase; their share had gone up to around 70 percent by 2010 (Wang et al. 2011).

2.2 The Setup of China's Energy Sector

The way that its energy sector is structured certainly has a bearing on the policy stance taken by a country. State monopolies in energy production (from fossil fuels) and in distribution may – especially if granted a degree of autonomy – be a factor that makes the implementation of energy-saving policies more difficult. The geographical dispersal of sites of energy production, together with only moderate productivity in power generation, would also not be of much support to this end. China has traditionally been plagued by these twin disadvantages: Despite the closure of its smaller sites and companies, China's coal industry remains fragmented. Large and small state-owned mines account for 60 percent of production. The remaining 40 percent are mined by thousands of different town and village mines. The top three companies in China produce less than 15 percent of all domestic coal. The smaller mines are inefficient – with insufficient investment, outdated equipment and poor safety records. As part of the 12th Five-Year Plan, the government intends to consolidate the sector and to create larger mines. With the same aim, cross-business ventures are being encouraged between power, industrial and coal companies. In order to modernize existing large-scale mines and to introduce new technology, China opened the coal sector to foreign investment after 2008. A particular area of interest is coal liquefaction, which has a long history in China – although it was neglected after the discovery of large domestic oilfields in the 1960s. In the early 1980s interest in liquefaction techniques was revived in the aftermath of the world oil crisis, and, even more so, as a result of China becoming a net oil importer (Sun 2010). The first such facility operated in tandem with a foreign partner was commissioned in 2009 (IEA 2009; EIA 2010b).

In contrast to coal mining, China's oil and gas sectors are clearly structured and dominated by two state-owned enterprises that emerged out of a government-led reorganization process: the China National Petroleum Corporation (CNPC) and the China Petroleum and Chemical Corporation (Sinopec). The CNPC is the larger and more influential of these firms. They dominate up- and downstream activities in oil and gas; another state-owned company, the China National Offshore Oil Corporation (CNOOC), is responsible for offshore oil exploration. All of these companies have become key actors in Chinese foreign policy; further details on them will be given below in due course. With the launch of the 10th Five-Year Plan, the Chinese government decided to establish a public and strategic oil reserve to shield China from potential supply disruptions. Construction of Phase I with a storage capacity equivalent to approximately 25 days' worth of oil imports was completed in 2009. Once completed, Phase III will bring storage capacity close to nearly 120 days worth of imports (EIA 2010b).

Given the vast territorial extent of China and the aforementioned enormous distance between coal resources and energy consumers, it is understandable that the Chinese government has concentrated on the development of its transmission network and has given investment in new generation capacity only secondary prioritization. In 2002 the monopoly of the State Power Corporation was dismantled into separate generation, transmission and ser-

vice units. The generation sector is now dominated by five state-owned holding companies, with much of the remainder being generated by independent power producers – often in partnership with de facto state companies. The power sector has also been opened to foreign investment, albeit with an only modest effect so far. The transmission and distribution sectors are still heavily controlled by the state. In 2002 the State Electricity Regulatory Commission (SERC) was established, charged with overall regulation and with the improvement of investment and competition (EIA 2010b).

One conclusion we could draw from all this might be that the preponderant weight of coal in the energy mix, its cost advantages compared to all other energy sources, the significant sunk costs in the exploration and exploitation of local energy resources, the long gestation period for the development and amortization of new energy and/or renewable sources, and the presence of large state-owned enterprises in the exploitation of domestic oil and gas, in combination with the fragmented structure of coal production and the large number of staff employed therein, would make restructuring an uphill task indeed. In addition, such unfavorable conditions come on top of China's relative over-industrialization and the disproportionate weight of energy-intensive industrial sectors, leading to a path-dependent structure that it would not be possible to rapidly alter. These circumstances seemingly militate against a swift turnaround in energy policies occurring in China; paradoxically, however, this is actually precisely what seems to have happened.

2.3 Domestic Energy Strategies

As China owns substantial energy reserves, self-reliance based on domestic resources was for a long time the core principle of China's energy policy. However, once production could no longer keep pace with demand due to the economic boom that came in the decades following the economic reforms of 1978, China became dependent on foreign partners of questionable social and political stability. It suffered as a consequence from fluctuations in price and supply. Nevertheless, the energy intensity of production, existing at unacceptably high levels until the 1980s, dropped markedly thereafter (see Figure 1) – although since 2002 there has been a sudden and noticeable rise (World Bank 2010). This obviously unsustainable reversal, combined with mounting concerns about energy security, rising oil prices and growing awareness about the environmental impact of wasteful consumption, has led to a drastic reorientation in China's energy policies. In 2005 senior leaders of the Communist Party and government agreed that the demand for energy somehow had to be brought under control. A later communiqué of the politburo called for a reduction in energy intensity by 20 percent in the next five years (Zhou et al. 2011c). This target was incorporated into the 11th Five-Year Plan (2006–2010).

The main objectives that were articulated in the 11th Five-Year Plan with regard to energy supply were:

1) the diversification of energy sources by increasing the production of natural gas and nuclear power, by generating gasoline and diesel from coal, and by increasing the usage of renewable resources;
2) the enhancement of existing oil and gas supply sources and the diversification of import routes;
3) the strengthening of energy exploration and the production of new oil fields domestically, as well as the further encouragement of international cooperation in offshore oil exploration and production; and
4) the increase of the volume of strategic petroleum reserves and the securing of supplies through overseas equity investments and long-term supply contracts (Jian 2011).

Regarding the saving of energy, this plan set the ambitious goal of reducing the energy intensity of the economy by 20 percent by improved means of energy conservation and an increase in energy efficiency. The former was to be achieved by structural changes (optimizing industrial structures and reducing the share of energy-intensive industries), while the latter was to be fulfilled by developing and disseminating energy conservation technologies and better management practices. Those industries targeted for energy conservation measures were: iron and steel, non-ferrous metal, chemistry, electricity, coal and building materials. Furthermore, the fuel efficiency of vehicles was to be enhanced, inefficient vehicles were to be phased out and the production of energy-efficient products was to be encouraged (Climate Policy Initiative 2011). Although this was the first five-year plan to set energy efficiency targets, it did not initially discuss in detail how this should be achieved. The overall figure was, however, broken down regionally (and later down to the local level), and every province was asked to propose its own target. These fell more or less in line with the overall benchmark, irrespective of regional peculiarities (e.g. a more-or-less developed industrial sector or the different weight of heavy industries). Provincial and local targets were not meaningless or simply symbolic, but were actually coupled with sanctions: officials and bureaucrats at both levels were evaluated based on whether they reached their respective targets. If they had not, they were subsequently ineligible for promotion. Such an approach would obviously only be possible to enact in a top-down political system (Climate Policy Initiative 2011).

Since 2005 specific programs have been put in place in the industrial sector in order to support China's efforts to reach its targets on the intensity of energy usage. These programs have all contained specific energy-saving goals. The most critical initiatives have been the Top-1000 Energy-Consuming Enterprises Program (2006), the Ten Key Energy Conservation Projects and the Small Plant Closure Program. The Top-1000 Program set energy-saving targets for China's highest energy-consuming enterprises across nine industries, at a level on par with the most energy-efficient producers in China. These enterprises accounted for approximately 50 percent of overall industrial energy consumption and 30 percent of total energy consumption in China. Companies were required to commission energy audits and to

report quarterly on them to the government. The Top-1000 Program targets are to be striven for also on the provincial level. In 2006 all participating enterprises signed energy conservation agreements with local governments. Some provinces went even further than was required by this program and included additional enterprises. Those included in the Top-1000 Program were able to take advantage of a number of funding opportunities, the generosity of which was dependent on the amount of energy saved (Price et al. 2010). The Ten Key Projects included larger coal-fired industrial boiler retrofits, district level combined heat and power projects, waste-heat utilization, oil conservation and substitution, energy systems optimization, motor system efficiency, energy efficiency and conservation in buildings, energy-efficient lighting and the monitoring of energy-saving initiatives. The Small Plant Closure Program was devised as a way to optimize the structure of China's manufacturing sector. It included financial incentives designed to ease the social costs of closing outdated production capacity. These three core programs were intended to achieve 27, 29 and 22 percent, respectively, of the overall saving targets of the 11th Five-Year Plan.

In addition, complementary to the already-existing energy standards for buildings, a national energy standard for commercial buildings was adopted in 2005, which set a target of a 50 percent reduction in energy usage as compared to pre-existing buildings. A revised standard for residential buildings that combined previous regional standards was also discussed, but ultimately postponed (Zhou et al. 2010). In 2005 China also launched the mandatory energy-information labeling of appliances, adapted from the EU model. Initially it only applied to refrigerators and air conditioners; later, however, the program was extended to include nearly all other important appliances. Fuel-economy standards for passenger cars had already been introduced in 2004, based on weight. Although they were at that time already stricter than U.S. standards, they were nevertheless raised to the Euro IV level in 2010. The government has also introduced policies prioritizing the development of public transport – achieved by lengthening railway routes and overseeing their electrification, as well as by the introduction of new high-speed lines (Climate Policy Initiative 2011). Finally, the government implemented in 2005 a new program of government energy-efficient procurements, which started at the central level but were extended nationwide in 2007 (Zhou et al. 2011c).

The Renewable Energy Law was enacted in 2005 – it set the stage for the scaling-up of renewable energies and obliged grid companies to purchase all electricity generated from renewable sources at favorable prices. A dedicated fund was also established for developing renewable energies as part of this legislation (State Council of the PRC 2008). The procedures for attaining administrative approval for wind power projects were simplified, while further research on renewable energies was encouraged. The Renewable Energy Medium- and Long-Term Development Plan, which came into force in 2007, outlined the country's commitment to increasing the share of renewables to 15 percent of the primary energy supply by 2020 (World Bank/ESMAP 2010). Finally, under the "Golden Sun" program that was announced in 2009, the government declared that it would subsidize the costs of installing solar power

generation and transmission systems for projects selected by provincial governments by up to 70 percent (WRI 2009).

These new initiatives have also been accompanied by various energy-pricing reforms and fiscal incentives. By 2006 energy prices had nearly been brought into line with actual costs. Coal prices are now largely unregulated, while oil prices still lag behind world-market rates. Industries consuming energy at high levels have had to pay more for electricity since 2004. A new formula differentiated prices according to energy intensity. China's new corporate income-tax scheme (started in 2008) grants preferential treatment for those investing in energy-saving and eco-friendly projects and equipment. Taxes on larger, less-efficient vehicles were raised in 2006. In the same year, export tax rebates for many low value-added but high energy-consuming products were reduced. In conclusion to this outline, it should be noted that the programs for energy conservation and saving as well as for the development of renewable energies, articulated as part of the 11th Five-Year Plan, were extremely ambitious and covered nearly any and all aspects. In fact, they were more encompassing than the energy policies of any of the other emerging economies.

As the low-hanging fruits had already been identified by the 11th Five-Year Plan, it came as no surprise that the 12th Five-Year Plan (2011–2015) did not demonstrate even greater ambitions. Herein, energy intensity has been targeted for a drop of only 16 percent by 2015, while the share of non-fossil fuels in the energy mix is expected to increase to 11.4 percent. Compared to their inclusion in earlier Five-Year Plans, however, resource conservation and environmental protection were given a far more prominent place in the policy document this time around. They were listed as being key targets, to be fortified by binding commitments made with the central and provincial governments. Specific goals that were mentioned were: the development of diversified and clean energy – based on the efficiency improvement of coal mines, promotion of gas resources and the development of heat and power cogeneration from hydro-, wind, solar and nuclear power; the development of integrated energy bases to reduce the pressure on long-distance transmissions; and, the strengthening of energy transmission channels. These aims were complemented by a long chapter on green development and energy conservation – envisaging restrictions in energy consumption, enhancing energy-saving regulations and improving market mechanisms (e.g. cap-and-trade systems and carbon taxes). Even more importantly, these energy-related strategies have been embedded in an overall program designed to promote structural change within the whole industrial sector – with an emphasis on technology-intensive, energy saving and environmentally friendly subsectors, among others (National People's Congress 2011).

China also intends to rapidly develop nuclear power, with installed capacity to be increased by an additional 40 gigawatts (GW) from the current level of 10 GW. New approvals have, however, been halted since the Fukushima disaster of March 2011. Wind power output is to be raised to 70 GW, which would almost triple the existing capacity, while solar capacity is to be doubled. The Top-1000 Energy-Consuming Enterprises Program is to be extended to

cover an additional 10,000 firms, while rail transport will be favored by the construction of another 35,000 kilometers of high-speed rail and the expansion of urban transit systems. Further to this plan, the government has also announced a cap on total energy use equivalent to 4.1 billion tons of oil by 2015. In addition, a thoroughgoing shift in industrial policy was announced, with an emphasis – backed by public support – on nuclear, solar, wind and biomass technology industries, as well as on hybrid and electric vehicles and energy-saving industries (KPMG 2011; Lewis 2011; Seligsohn 2011; Seligsohn and Hsu 2011). The 12th Five-Year Plan also stipulated the goal of gradually establishing a carbon-trade market, although the exact details of this have been left open. Some provinces have expressed an interest in piloting such a scheme. Concerns were raised, however, by both domestic and foreign firms that such regulation would affect their profits. In any case, China does not (yet) possess sufficient technical capacity to accurately measure and monitor the carbon emissions of individual users (Lewis 2011). In late 2011, however, the National Development and Reform Commission (NDRC) ordered seven Chinese cities and provinces to set up pilot carbon-trading schemes. The relevant authorities were asked to submit proposals on how carbon emission targets will be allocated and to present detailed plans on implementation. Sectorial carbon-trading schemes are currently under consideration, with the central government determined to introduce a nationwide cap and trade scheme by 2015 (Han et al. 2012).

According to nearly all international experts, China has managed to engineer a drastic shift in its energy (and climate) policies. This it has done not only verbally, but through also enacting various laws, regulations and incentives, ones that contain specific and binding commitments for all relevant levels of government and the public/private economic sector – as well as sanctions in cases of non-compliance. China is, therefore, widely considered to be a constructive player in this field (Hallding et al. 2009); its policies are seen as "heading in the right direction" (SEI 2009) and its "aggressive push into green technology" is "bold and visionary" (Ma 2010). The question remains, though, whether the policy outcomes attained are actually commensurate with the bold announcements made and actions taken.

2.4 Policy Outcomes

Contrary to popular perceptions in the West, China has not only set goals for itself regarding the improvement of its environmental and energy policies but also made significant strides in achieving them (Seligsohn 2011). Indeed, energy intensity dropped considerably – by 19.1 percent – between 2006 and 2010 (see Figure 1), falling just short of the intended target of 20 percent. Responsible for this marked progress were four programs in particular (see below). Most of the programs included in the 11th Five-Year Plan did meet the targets aimed for (see below). A second performance indicator would be the amount of public expenditure that has been earmarked for energy efficiency and environmental protection measures. During the course of the 11th Five-Year Plan the Chinese government allocated a massive budget – of

200 billion CNY (approximately 30 billon USD) – to these measures, though this amount is dwarfed by the far larger expenditures (3 trillion CNY or approximately 450 billion USD) that have been envisaged for the execution of the 12th Five-Year Plan.

China made significant progress in increasing the efficiency of thermal power generation during the 11th Five-Year Plan. Primarily responsible for this was the shutting down of small generators of lower efficiency and their replacement with larger units. Units larger than 600 megawatts (MW) accounted for only 13 percent of thermal power generation in 2005, but for 34 percent in 2009. China is already operating 21 ultra-supercritical generation facilities based on coal, with a further 24 units under construction. This has made it the world leader in this field. Additional savings were achieved by a slight improvement in the efficiency of coal-fired plants as well as by more efficient transmissions (Climate Policy Initiative 2011). Furthermore, China's nuclear and renewable energy industries have developed rapidly since the enactment of the Renewable Energy Law. The installed capacity of renewable sources climbed up to 37 GW in 2009, thus accounting for 46.3 percent of global capacity (Climate Policy Initiative 2011). Hydropower achieved the largest absolute growth, while wind power growth was fastest in relative terms (with an annual growth of 130 percent between 2006 and 2009).

The most important contributors to energy saving measures in the industrial sector were: plant closures (129 million tonnes of oil equivalent (Mtoe) saved); the Top-1000 Program (124 Mtoe); the Ten Key Projects (102 Mtoe); and other initiatives – including provincial programs (144 Mtoe). Thousands of plants, especially in cement production, hundreds of power plants and thousands of mines were closed during the years from 2006 to 2010 – combined, they had cumulatively consumed an amount of energy equal to that added over the 11th Five-Year Plan (Krahl 2009; Seligsohn et al. 2009; Lewis 2011; Price et al. 2011). The Ten Key Projects were found by international experts to be fully on track to achieve or even surpass the goals of the 11th Five-Year Plan. The Top-1000 Program achieved its targets earlier than planned, most probably because of the public display of the firms in question and the strict links established between the program's success and the career prospects of government officials. Finally, the program for the closure of small plants was also on track, with only one of out ten sectors trailing behind (Price et al. 2011).

The results for the increase in the energy efficiency of buildings were more mixed. In 2006 only 60 percent of all new constructions in urban areas met the required standards during the design stage, and only 38 percent did by the time it came to construction. As a result, the ministry in charge put into place a stricter program of enforcement – leading to a significant raise in compliance standards by 2008 (98 percent at the design stage and 81 percent by the time of construction). Heat-metering reforms met with less satisfactory results, as did retrofitting for the reduction of heating intensity. The main reason for these shortcomings was the insufficient financial incentives offered to those installing the necessary equipment. The program regarding appliance standards suffered from inadequate checktesting (with around

only 1 percent of all product models on the market being assessed), due to the enormous variety of models available – and of enterprises producing them.

Energy consumption is not only influenced by the relative energy efficiency of production plants, but also by the overall economic structure of a country. As was already mentioned, the Chinese government's intention was to lower the relative weight of heavy industries and low value-added production during the timeframe of the 11th Five-Year Plan. With regard to structural change, success was less satisfactory. Heavy industry continued to grow, but its share dropped relative to other sectors. As a part of this shift, the weight of higher value-added products helped to improve energy intensity. Finally, many of the larger industries significantly improved their efficiency after 2005, spurred by process and technology improvements and the closure of older facilities (Climate Change Initiative 2011).

Perhaps the most visible results have been achieved with regard to renewables: China has become one of the top investors in this sector. In 2010, it was the biggest investor in clean energies, with an expenditure of 54.4 billion USD. Traditionally, hydropower has been the main source of renewable power in China and will continue to be so. The country has the highest installed hydro capacity in the world – this increased by 10 percent per annum during the 11th Five-Year Plan (Cheung 2011). While hydropower thus has a long tradition of use in China, the new superpower has now become involved with as many different renewable resources as it possibly can. It not only is the world's largest producer of wind turbines but also has the world's largest installed wind power capacity, having overtaken the United States in 2010 (Seligsohn 2011). Moreover, China has also become the world's largest producer of photovoltaic cells. The government has announced plans to increase spending on relevant research and design. Although most photovoltaic panels are exported, subsidies for installing such systems in China are set to be granted extensively – in order to foster a strong domestic market. The government has also announced ambitious targets for the expansion of its domestic nuclear capacity. The current capacity of 10 MW is to be increased to 40 GW during the 12th Five-Year Plan, although the program has stalled somewhat in the wake of the Fukushima catastrophe. Both the public and private sectors are increasingly using waste gases that have been captured from such facilities as dumps, manure pits and coal mines to generate heat and electricity for household usage. More than 50 cities currently run waste-to-energy heating plants (WRI 2009).

Wind is the second-largest renewable source of power generation; China is already the world's fifth-largest wind energy producer. The lack of an adequate transmission infrastructure has, however, left a significant amount of capacity lying idle. Wind power capacity doubled throughout 2006 and 2007, prompting the government to double its target for 2010. This rapid rate of development continued throughout 2008 and 2009; capacity had already reached 122 percent of the revised target for 2010 by the end of 2009 (Seligsohn 2011). As a consequence, targets have once again been raised – now set at the generation of 150 GW by 2020 (Cheung 2011). The target for the development of wind energy is now 70 GW of addi-

tional installed capacity, to be achieved during the timeframe of the 12th Five-Year Plan. Only biomass-fueled capacity fell short of the targeted increase (Seligsohn and Hsu 2011). Overall, therefore, there has been a very high level of achievement for the stipulated goals, much more so than has been the case among other emerging powers – and in spite of the outlined difficulties inherent in an energy policy shift in China.

3 Causes and Relative Successes of the Policy Shifts

This leads us to the last section of the analysis, in which the root causes of the shifts in energy policy, as well as their relative successes, need to be evaluated. The article will attempt to differentiate several internal and external causes, striving in each case to assay the explanatory merit of the relevant causal factors.

3.1 A Unified Institutional Setup?

The favorable outcomes achieved by China's revised energy policies could be ascribed, first of all, to the unified institutional setup of, and the strict command exercised by, the Communist Party on energy policies. However, drawing such a conclusion is problematic for the following reasons.

a) Taking such a view negates the relative institutional chaos that characterizes China's energy policies. For quite some time there was no overall governance in China when it came to the energy sector. Although state energy companies were brought under the jurisdiction of the newly formed Ministry of Energy in 1988, this ministry failed to govern effectively – because its authority overlapped with that of the State Planning Commission and because the ministry's influence was confined to the electric power sector, due to the refusal of other industries to coordinate their planning and investment with it. The Ministry of Energy was finally abolished in 1993, leading to the responsibility for energy policy becoming once again dispersed. In 2003 the State Council established the NDRC's Energy Bureau, making it responsible for the coordination of the energy plans, policies and projects of the dozen other ministries involved in energy policy-making and of energy companies; however, it had neither the authority nor the resources to be effective in these regards. Turf battles between various energy institutions continued, delaying or preventing altogether the implementation of laws (e.g. of a fuel tax agreed upon in 1999). This political vacuum has often been filled by the initiatives of state oil and gas companies themselves, especially with regard to projects in foreign countries – but also with regard to the fixing of prices (Downs 2008; Krahl 2000). Such companies also became actively involved in the drafting of the country's energy laws and began to occupy key posts in the state's supervisory bodies (Downs 2008). In 2005 another relatively powerless agency – the State Energy Office – was added to this assemblage in the energy sector.

In 2008 renewed attempts were made to create an effective national-level regulatory institution – the National Energy Administration (NEA) – which would work together with the National Energy Commission (NEC), an oversight body for discussion and strategic planning. The NEA, like its predecessors, was equipped with a broad mandate – to manage energy-related industries, draft energy plans and approve foreign energy investments. The NEA did not, however, have sufficient clout either to mitigate the infighting among different agencies or to impose its will on the heads of state energy companies (holding, as they did, ministerial rank). Its staff remained rather circumscribed, and it also had no power to decide on energy tariffs (with the responsibility for them remaining with the State Council). In 2010 the last attempt at overall coordination was made with the establishment of the NEC, to be directed by the prime minister himself. Its key functions are to be the production of national energy development plans, the review of the country's energy strategy, the implementation of a unified energy policy and the coordination of international cooperation. The NEC is to be composed of 21 ministers and directors from different departments, including the NDRC, the NEA and the Central Bank (Downs 2008; Krahl 2009; Kong 2011). Whether the new agency will carry any more clout than its predecessors did remains to be seen. Responsibility for important aspects of energy policy – especially pricing – still rests with the NDRC, which has also tried to obstruct the formation of an energy ministry – as energy pricing is one of the most important levers in steering the economy (Downs 2008).

Needless to say, China's national oil companies were also against the formation of the NEC. These companies have become more autonomous since market-oriented reforms were enacted, and now even have subsidiaries listed on foreign stock exchanges. They contribute a large share of China's income from tax, although they are not required to pay dividends, a situation that has been propelled by rising international oil and gas prices and which means that they can now make their interests heard. The most important oil companies hold ministerial rank, giving them direct access to the state's political leaders – their chief executives all hold the rank of vice-minister. Quite a few of the current members of the party's Central Committee began their career in the oil industry, circumstances that have given rise, at least according to some observers, to a "petroleum faction" within the state's leadership circle. These companies also previously loaned employees to the government's understaffed energy bodies and they thereby became involved in the drafting of the country's energy policies. They obviously benefit from the current power vacuum in domestic energy governance and have even been able to pursue their own foreign economic policies to some extent: even though the NDRC excluded Sudan from the list of countries in which Chinese companies were encouraged to invest in 2007, the CNPC nevertheless acquired new assets in this country. A couple of other examples could also be cited (Kennedy 2010).

b) The statement in Section 3.1 ignores how a coherent energy policy is also hampered by the considerable amount of autonomy enjoyed by the provinces in economic and energy policies. This is exemplified by their resistance to the cessation of preferential electricity pricing for energy-intensive companies residing within their boundaries, which has forced the central government to stiffen directives on several occasions (Zhou et al. 2010). The decentralization of tax and fiscal policies in 1994 created incentives for local governments to look for new ways to boost their income from taxation; they subsequently became responsible for their own growth, which constitutes the principal performance measurement assessed by party officials. Local governments often, therefore, overshoot the centrally determined energy targets if this yields local benefits. A case in point is the frequently higher quantities of coal produced in certain provinces than the amounts stipulated by the central government itself. Conversely, inefficient and highly polluting production facilities are often allowed to continue with their operations and to exaggerate the reductions achieved in energy intensity. The partial privatization of energy companies and the corporatization of state energy companies, together with their greater operational freedom and widespread corruption within the relevant agencies, are doing the rest to considerably undermine centralized energy governance (Kong 2011).

c) The perspective that the outcomes were favorable overlooks the fact that progress was not uniform: small hydropower initiatives have suffered from substandard design and equipment, as well as from poor control systems. Large power enterprises are not permitted to include these small hydropower schemes in their legally mandated energy mix. Small hydropower programs also suffer from very low – and locally regulated – prices (World Bank/ESMAP 2010). Large dam projects have come under heavy criticism and have faced political opposition from China's growing and increasingly more assertive civil society. Although it was unable to stop the construction of the Three Gorges Dam, the campaign by NGOs against the Nu River project was successful insofar as it caused the government to stall the project in 2004 (Xie 2011). Regarding wind power, a sizable share of the installed capacity is not connected to the grid in a timely manner after commissioning, because of inadequate coordination between developers and operators. The capacity of wind farms is lower than it is in developed countries, because of their use of unproven turbines and the development of sites without either the prior confirmation of resources or the benefit of proper micrositing studies having been carried out. In biomass development, defects in local feed-in and in the equipment for generation have hindered the development of the technology (World Bank/ESMAP 2010). Even more important to note is the fact that wind power is mostly generated in the north and northeast of the country, thus being produced at great distances from the main centers of demand. The trans-regional export of wind power is currently still hampered by the low capacity of interregional transmission lines. Grid operators frequently curtail the power generated from wind, while wind farms run for an insufficient number of hours to remain economi-

cally viable. As a result, and due to the fluctuations inherent in wind power supplies, coal will remain the predominant source of energy (Cheung 2011).

There have also been deficiencies in the meeting of targets for some energy-saving programs. Retrofits of existing buildings and the completion of metering reform have fallen far short of targets, partly because the incentives for households were insufficient. It is, in addition, difficult to measure the exact impact of energy savings in the buildings sector, as no reliable data has been gathered (so only estimates can be made). Finally, building requirements do not currently apply to rural areas. The energy-efficiency goals established for household appliances have also only partially been met; with the advances made in the checktesting of appliances results have, however, improved. Nevertheless, a shortage of both resources and funding for monitoring and evaluation efforts remains (Price et al. 2011).

d) The lauding of the unification fails to take into account the fact that China does not currently have a unified national electricity grid; the system is fragmented into six clusters, all of which operate more-or-less independently of each other. Each company therein is responsible for its own profits (and losses). As a consequence, there is at present little incentive for intercompany cooperation. The cross-regional trade of electricity represented only 4 percent of total electricity production in 2009 (Cheung 2011). A plan to build a unified, strong and smart grid is, however, already under consideration – intended to be operational by 2020.

e) Emphasizing the favorable outcomes belies the fact that an environmentally sound energy policy is also hampered by pricing issues. Reforms in this domain have thus far been piecemeal and insufficient: the Chinese government launched fuel tax reforms in December 2008, so as to tie the retail price of oil products more closely to those of international crude-oil markets. These reforms were enacted after price-capping in the middle of that year had caused small refineries to cease production. Retail prices in China now follow the evolution of crude oil prices, albeit with a certain lag. Gas prices in China are set according to pipeline developments and the specific category of industry customers and remain well below world-market rates. There is a certain degree of cross-subsidization in favor of gas manufacturing and fertilizer users. In order to develop the gas market, the NDRC proposed linking gas to international crude oil prices. This led to a price hike of 25 percent in 2010. Coal prices are also state-controlled, with end-user prices being raised for energy-intensive sectors by between 50 to 100 percent in 2010 – while remaining low for the residential sector. Electricity prices are controlled by the NDRC. From 2009 the agency allowed electricity producers and wholesale end-users to negotiate with each other directly. End-user prices were raised for all consumers in 2009 – and again in 2010 – with the exception of those in the residential sector. In this sector, the average electricity price is still around half of the international average (EIA 2010b; Cheung 2011). Electricity

prices still, therefore, serve as a tool by which to keep the inflation of consumer prices in check and by which to support social stability.

f) Making the assumption that the process was both highly organized and strictly unified discounts how Chinese authorities have, in part at least, employed rather crude methods in order to enforce energy efficiency – which demonstrates that compliance by the relevant players was not always to be taken for granted. For a long time the state relied on a system of pure command and control, often enforced by simply closing down any inefficient/polluting plants. Electricity saving was "achieved" during the last phase of the 11th Five-Year Plan simply by load-shedding (i.e. enforced blackouts). Economic tools for achieving the same results (taxes, tradable permits and so on) have played only a limited role. During the lifetime of the 12th Five-Year Plan, however, cap-and-trade mechanisms are to be introduced both successively and nationwide up until 2015. Pilot schemes for these have already started in seven provinces/municipalities (Han et al. 2012; Tianbao 2012).

3.2 The Growth of a Green Movement in China

One obvious factor that could have spurred more climate-friendly Chinese energy policies is the growth of environmental civil society organizations in the country. Although such organizations came under stronger state control in the 1990s, their number has increased tremendously – to approximately 3,500 by 2008, excluding unregistered organizations. Incidents of environment-related protest have multiplied, as have petitions signed by citizens and lawsuits seeking compensation – both regarding environmental damage and the halting of illegal construction and production (Otsuka 2009; Alpermann 2010; Xie 2010). Not all of these activities undertaken by civil society organizations have been welcomed by the authorities; interestingly, however, the rather weak Ministry for the Environment and the various agencies charged with environmental protection often seek out the support of NGOs to enforce environmental regulations, to rein in negligent local authorities, or to act as allies against line ministries (Alpermann 2010). The state sector is, therefore, far more fragmented in environmental matters than is often made out, and as a result, opportunities exist for environmental NGOs to make their case heard. Energy policies, as long as they do not overlap with environmental protection concerns, may be more difficult terrain in which to mobilize popular support. Indeed, there are currently only a few representatives from civil society (mostly academics) sitting on state energy committees. Consequently, while the influence of civil society on the shifts in energy policy has certainly been felt, it should not be exaggerated.

3.3 Authoritarian Environmentalism

Less environmentally damaging energy policies should theoretically be more easily implemented within democratic regimes – as the latter are more dependent on the preferences of

median voters (instead of those of a small elite), supported by a free press, and guided by unrestricted civic activism. Democratic regimes should also be internationally more cooperative with regard to climate targets and reasonable energy policies. Unfortunately, such expectations are hardly confirmed as realistic by the empirical evidence. The positive nexus between environmentally friendly policies and democracies is valid only for consolidated democracies existing at a certain level of development. At the other end of the spectrum, stable autocracies may actually be more able to implement progressive policies for the good of the local environment and of the global climate than their less consolidated democratic counterparts are (Ward 2012). This phenomenon is captured by the term "authoritarian environmentalism," which ascribes a certain advantage to countries like China – which are able, if they so desire, to simply forbid any environmentally unsustainable forms of behavior (Beeson 2012). This may be a rather strong and provocative hypothesis, but, with regard to the success of the energy-saving policies mentioned above, it is certainly plausible. There are certainly fewer veto players and powerful private companies able to obstruct a switch to less-energy-consuming strategies in China than there are in more democratic states; in less-stable democratic regimes in the global South, agenda-setting and policy-making in the energy sector is still confined to a narrow, technocratic elite. This statement should, however, be qualified by noting the growing fragmentation of authority over energy and climate policies and the relative autonomy of state energy corporations outlined above.

3.4 The Impact of Climate Change on China

China has long been a hardliner in international climate negotiations; up until the Copenhagen Summit of 2009 it opposed developing countries making any binding commitments to reduce emissions. China argued that it had a pressing need for economic development and poverty eradication, cited the far-higher per capita energy consumption and climate gas emissions of developed countries and pointed to the design and implementation of its own responsible energy practices. Shortly before the Copenhagen Summit, however, the Chinese government announced that it would make a voluntary commitment to lowering the energy intensity of its growth by between 40 to 45 percent by 2020. An important cause of this shift was the official realization (from at least 2007) that China itself would be disproportionately hurt by climate change and in any case would have to find ways to save energy. This is borne out by econometric studies (Rong 2012) that have identified China as the country most affected by climate change (especially in terms of rising sea levels), after India. For this reason, public authorities in China criticize the excessive consumption of energy, poor energy management and the over-reliance on coal as a source of energy, as well as the extensive patterns of economic growth. As a result, "the basic themes of China's energy strategy are giving priority to thrift, relying on domestic sources […] protecting the environment and increasing international cooperation for mutual benefit" (State Council 2007).

3.5 Energy and Economic Restructuring

Saving energy, improving energy efficiency and developing renewables are the other side of efforts to mitigate climate change, even in the eyes of China's authorities. Programs to improve the outcomes in these domains take up by far the largest part of "China's Policies and Actions for Addressing Climate Change" (2008). Saving energy is, therefore, a win-win strategy for achieving energy security, mitigating climate change and, last but not least, modernizing China's economic structures. This is clearly spelled out in official documents (e.g. National People's Congress 2011). This strategy is supported by the allocation of public resources for industrial restructuring and the improvement of the energy efficiency of existing industrial clusters and means of energy generation, the development of alternative energy sources and for public research and development efforts. It is common knowledge that this strategic reorientation has already led to massive inroads being made by Chinese companies in certain world-market subsectors (most prominently, those of wind and solar power installation). Given that it constitutes such a logical reaction to the dynamics of energy shortage and climate change, the question thus remains of why other emerging powers have been hitherto unable to engineer, at least with the same speed and vigor, such a strategic shift.

3.6 Limits to Going Abroad

Attention will now be turned to the international causes of China's shifts in energy policy; this paper argues that the aggressive Chinese practice of seeking secure energy supplies abroad has reaped only limited rewards. Given that China has recently become the largest energy consumer in the world, and that it is dependent on increasing energy imports, it is altogether understandable that it has looked to fill the growing supply gap by tapping into regional and/or global sources of energy. Regionally, Central Asia already constitutes, after Africa, the second most important region from which China secures its energy – through equity investments or long-term supply contracts. The combination of Central Asia's oil fields being closeby and the rather weak presence of the United States and of Western oil companies in the region made it an area attractive to China's state-owned oil enterprises in the mid- and late 1990s (Müller-Kraenner 2008). They thus started buying claims to lucrative oil fields in Kazakhstan in 1997 (Günther 2005). In those days, these were the largest energy-related investments China made abroad, supplemented by an agreement on the construction of a pipeline from Kazakhstan to the Chinese province of Xinjiang (Amineh 2006; EIA 2010b). China also agreed, in exchange for oil shipments, to lend certain Russian companies 25 billion USD in order to finance the East Siberia Pacific Ocean Pipeline. It has also since revived, through an agreement signed in 2009, its plans to construct an oil pipeline from Myanmar. This pipeline is destined to be an alternative transport route for oil from the Middle East and Africa, and will enable China to bypass the Strait of Malacca – made dangerous by the continuous threat of piracy.

China opened the first pipeline for the import of natural gas from overseas in 2009, bringing in supplies from Turkmenistan, Uzbekistan and Kazakhstan. There are also several massive pipeline projects underway in collaboration with Russia for the transport of Russian gas in the Far East to northeastern China. The CNPC finally signed an agreement with Myanmar in 2009 to finance the construction of a pipeline between two of Myanmar's offshore gas blocks and China (EIA 2011b). This was an agreement designed to outmaneuver India, which had long sought to win the contract (Khanna 2007). As far as the success of this regional outreach is concerned, Russia has not always been a reliable energy partner for China. Russia's deliveries have often fallen short of commitments, while pipeline projects have been endangered by growing energy nationalism in Russia, the latter being sometimes used as an excuse for the extraction of as much profit as possible. Finally, the cutting off of energy supplies to Belarus and Ukraine has further undermined Russia's perceived reliability as a partner in this sector (Müller-Kraenner 2008; Downs 2010).

Despite Russia's perceived unreliability in the energy sector, there are nevertheless some nascent elements of a multilateral energy setup emerging within Asia, wherein China, India and Russia are the most important players. Mutual cooperation on energy policies between China, Russia and the Central Asian states became institutionalized after the founding of the Shanghai Cooperation Organization (SCO) in 2001, which certain analysts believe has become a new alliance of petroleum-exporting countries, and which has already been talked about as an "energy club" by former Russian President Vladimir Putin (Müller-Kraenner 2008). Russia has been the most active partner within the SCO, proposing mechanisms by which to regulate energy production, transport, and exports (or more precisely by which to prevent a possible clash with China over Central Asia's energy exports) within the energy club of Russia, China, Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan. As the economic interests of the participating countries are all rather diverse – and alongside Russia's intention to contain China's rising influence in Central Asia's energy sector, China's interest in improving its energy security by facilitating better access to Central Asia's resources and the countries of this region striving for a lower level of dependency on Russia in the export of oil and gas – nothing really tangible has yet come out of these proposals. China and Russia both continue to pursue their energy interests mainly by bilateral means, while the SCO has remained only a talking shop whose institutional basis for cooperation is unresolved to this day (Maurer 2011). An even more anemic attempt at energy multilateralism was made at the East Asian Summit in 2007, wherein the Association of Southeast Asian Nations (ASEAN) countries, along with Australia, China, India, Japan, Korea and New Zealand, all signed the Cebu Declaration on Energy Security with the purpose of improving regional energy cooperation – an effort that has, however, continued to only ultimately pay lip service to the issues at hand (Gu and Mayer 2007).

Switching to China's global strategy, one first has to recognize that, despite all the efforts to save energy at home and to explore and exploit domestic reserves, China's dependence on

imported fossil fuels from a handful of politically unstable countries has not significantly declined (see figures in Jian 2011: 17). In addition, the majority of imports are transported through sea routes patrolled by the U.S. Navy – most importantly, the Strait of Hormuz in the Persian Gulf and the Strait of Malacca in Southeast Asia. Accordingly, Chinese energy analysts have given early warnings of a possible "energy containment" strategy being mounted against China (cited in Downs 2004). In reaction to this threat, the Chinese government has supported, first, a diversification strategy that includes obtaining oil and gas imports via land-based pipelines from Central Asia, Russia and Southeast Asia, as mentioned above. Second, Chinese energy companies have bought equity abroad or have negotiated long-term supply contracts with countries further afield. Africa has been major focus of such practices: after increasing oil imports from Algeria, Egypt and Libya, Chinese firms later began exploration and production activities in Sudan, Gabon and Angola. Sudan has become China's largest overseas production base, while Angola recently became the largest exporter of oil to China. Agreements with African countries have been complemented by official development assistance, debt waivers and subsidized commercial credits (Gu 2005). China's overseas investments have come under heavy criticism from the international community, as they focus on rogue states such as Iran, Myanmar, Sudan and Venezuela – which has been detrimental to China's desire to be regarded as a responsible global power, and has also undermined the U.N. sanctions that are in place against some of these countries (Müller-Kraenner 2008). As a latecomer to the world energy market, wherein the biggest opportunities had already been taken by the major Western powers, China could hardly have acted otherwise. For this reason, China's oil companies have invested in producing countries that either have been placed under sanction or have thus far played only a very marginal role in relation to Western companies (Gu and Mayer 2007).

The Chinese are the most important investors in the war-torn province of Darfur (Sudan). The CNPC holds a 40 percent stake in a consortium that is developing large oil fields in Sudan and building an export terminal there. China has long opposed U.N. sanctions against Sudan for its human rights violations; activists argue, in contrast, that oil profits are sustaining the regime and that the CNPC has been providing arms to the Sudanese government in exchange for access to oil. Next on the list in Africa will be the Democratic Republic of the Congo, another fragile state. Other major investments have been made in – or agreements have been reached with – Ecuador, Iran, Iraq and Venezuela. Last but not least, Chinese companies have also been investing both in the upstream activities of energy companies in a couple of developed economies (CII 2010) and of Arab countries in China's downstream energy sector (Andrews-Speed et al. 2009). All in all, China's national oil companies are now operating in 31 countries worldwide, having equity production in 20 of them – though their equity shares are focused predominantly on Angola, Kazakhstan, Sudan and Venezuela. The production secured from the equity investments was equivalent to 36 percent of China's crude oil imports in 2010 (CII 2010; Herberg 2011; Jiang and Sinton 2011).

Equity shares are only one route by which China's oil companies have expanded upstream globally. The other has been service contracts with resource-rich Arab countries, who no longer allow equity participation. China's most important partner today for service contracts is Iraq. In 2009 the CNPC jointly bid with BP to develop Iraq's largest oil field for the next 20 years, and at the same time with Total and Petronas for another field in the country. The contract fees agreed upon were very low and some observers had doubts as to whether doing business in Iraq would even be profitable in the long run. Another contract partner is Iran; the CNPC signed a massive deal in 2009 to develop parts of the South Pars field there (Jiang and Sinton 2011).

China's energy policy of going abroad for resources has been criticized not only for its selection of wrong partners, but also for its overall statist and "mercantilist" approach to ensuring the its own energy security. China's political leaders obviously seem to have little faith that global energy markets can provide the country with adequate, reliable and affordable energy (Herberg 2011). It must be noted, however, that most of the oil produced as a result of Chinese equity investments has been sold to local or international markets, and that any production by its own enterprises overseas will add to the global oil supply – thereby acting as a brake on price hikes and fluctuations, and meaning that all importing countries will consequently benefit (Gu 2011). Equity oil is, in addition, obviously sold to the highest bidder, demonstrating that sales by China's national oil companies are determined predominantly by market considerations (Rosen and Houser 2007). As the production costs of equity oil for China – including, for example, expenditures on development assistance, subsidized credits for producer countries – seem to be higher than they are for contract oil, and exposed to higher risks – such as expropriation, labor unrest, the disruption of pipelines by terrorists – expert circles in China are already questioning whether going abroad really makes sense (Chatterjee and Sinha 2006; Kennedy 2010; Shaofeng 2011).

The recent disruptions of the oil market – caused by the upheavals in North Africa – have demonstrated that in times of crisis it matters more for oil security whether there is enough oil produced globally than who actually owns the production sites. China's oil imports are still growing at a rate three times greater than that at which its national oil companies can acquire or develop new overseas-producing assets. Equity oil will cover at most 15 percent of China's oil and gas consumption, and much less of the overall energy demand (Andrews-Speed et al. 2009). As such, domestic production can only be at best a partial solution (Herberg 2011). Lastly, we should also keep in mind that China's "mercantilist" strategy thus far may have also been motivated by the resistance of Western countries and companies to Chinese companies undertaking cooperative projects or investments in Western energy sectors. The most spectacular example of this has been the case of the U.S. Unocal Corporation, which China's CNOOC tried to acquire in 2005 – it was obstructed by a vote in the U.S. House of Representatives for "security reasons."

The strategies that China is pursuing in order to secure energy supplies from producing countries is fueling conflict with other import-dependent emerging economies, most notably India. China has had the upper hand in the competition for equity oil or long-term contracts, with the most high-profile cases being in Angola, Ecuador, Kazakhstan and Nigeria (Andrews-Speed et al. 2009). An agreement reached by India and China for joint inspection and development in third countries (2006) has brought little relief, as it was bereft of any significant follow-through – aside from some minor joint endeavors undertaken in Indonesia, Iran, Nigeria and Syria (Khanna 2007; Brütsch and Hulbert 2010; Gu 2011). Rivalry between China and India over energy sources and secure transport routes is also one reason for the competitive build-up of naval forces by these countries – which could one day spiral into violent conflict.

All in all, going abroad to acquire equity oil and gas may not, therefore, solve China's growing energy shortage in anything more than a marginal way. The sources of new supplies are concentrated, prone to considerable risks in their fragile environments and cover only a fraction of overall demand. Going abroad may actually not principally be a reflection of the long-term strategic objectives of Chinese authorities, but of the more mundane interests of China's oil companies – who are making handsome profits abroad, more so than they do at home (Kennedy 2010). Alternatively, this policy may be motivated by expectations of additional employment and foreign policy benefits (Andrews-Speed et al. 2009). These insights have also dawned on the representatives of Chinese think tanks and on certain members of the political elite itself (Chatterjee and Sinha 2006; Kennedy 2010; Shaofeng 2011). Consequently, the recent refocusing on energy saving and the development of renewables may represent the strategic counterparts to the perceived limitations of going abroad.

3.8 China as a Responsible International Power

A final but nevertheless important factor underpinning the strategic reorientation that has taken place in China's climate and energy policies is the desire of the Chinese government to be regarded as a responsible partner in global governance, a wish it has prominently expressed on several occasions (National Development and Reform Commission 2007; State Council of the PRC 2008). This desire is almost self-evident, and is expressed in terms similar to those also used by the governments of the other emerging powers who have been introduced into the inner circles of the global decision-making club. While admission has been permitted – by enlarging the G8 to the G20, or during the final negotiation phases of recent climate summits – it has by necessity come at a certain cost for the provision of global public goods. This is a demand made not only explicitly by established powers (as they try to engineer for themselves less costly means of sharing the global burden), but also implicitly by the poorer (African and island) states, who no longer seem to regard China – or the IBSA countries, for that matter – as belonging to the same class as they do.

4 Conclusion

China's energy policies matter for global supply and demand, as well as for global climate mitigation actions – especially as the country has become, and will remain, the largest energy consumer and greenhouse gas emitter worldwide (IEA 2011). The global supplies of fossil fuels left and the carbon space that remains are so scarce that if other and poorer countries are to have sufficient access to energy supplies and global warming is to be halted, any global solutions for overcoming – or at least managing – these scarcities must involve China. Put more starkly, even if developed countries do their utmost to save energy and to lower emissions, their efforts will come to nothing if China – as well as the other emerging economies like India, Brazil and South Africa – do not also contribute. At the same time, the leadership elites in these countries cannot simply abandon their ongoing ambition to maintain adequate growth rates, reduce poverty, increase employment and improve living standards. As result, balancing the requirements of social progress and growing prosperity with the taking of greater responsibility for climate-change mitigation will by no means be an easy task. In this regard, China is, however, better placed than the other emerging powers are – because of its exceptional economic dynamism, ample financial means, massive currency reserves and the growing competitiveness of its industries in the field of renewable energies, offering vast employment potential (World Bank 2012).

Switching to a new trajectory in energy policies is nevertheless politically rather difficult and risky, especially in China, as energy is an important aspect of living standards and costs there for many people who are still relatively poor. Further, and more important still, the economic costs of switching to a new energy strategy are higher in China than in other emerging powers – first of all because of the massive dependence on coal as an energy source; second, because of the disproportional weight of the industrial sector and of manufactured exports in the economy; and third, because of the still considerable share of public sector enterprises overall, especially in the energy sector. Lastly, these costs are high because of the declining but still high energy- and emission-intensity of production in China as compared to other, less developed countries. These would all seem to herald the distinct path-dependency of Chinese energy policies on the taking of a high energy intensity trajectory, an expectation now borne out by the massive initiatives that have been taken to save energy and develop renewable sources – as well as by their success. There was certainly some pressure exerted on China by the poorer developing countries during recent climate summits to change course, as well as some incentive for it to do that as a way to gain further international prestige; China could, however, have simply ignored the pressure and would have in any case eventually been introduced into the inner negotiating circles of the key global governance players. As a result, China's innovations in its energy policies cannot be attributed to international drivers; the only possible way in which the latter are relevant is that the policy changes may boil down to the slim prospects of gaining energy security by going abroad.

If a change has taken place, it must have been brought about more by revised internal calculations regarding the costs and benefits of continuing to pursue traditional economic and energy policies; the authorities in China itself consider previous practices to have been unbalanced, unsustainable, unequal and unreasonable (National People's Congress 2011). Also, China's traditional energy policies, based mainly on the combustion of coal, have contributed massively to the mounting greenhouse gas emissions experienced globally – with extensive negative economic and social impacts on China itself. Energy conservation, energy-saving, and switching to clean energy sources thus offer the triple benefit of achieving a higher degree of energy security, contributing to climate-change mitigation, and supporting the growth of China's new strategic industries – quite a few of which are now located in energy-related sectors. This logic could persuade the leaders of other emerging powers, too. However, their economies are less well positioned to benefit from green development than China's is, given that the latter is already the economic – and in some cases technological – leader in green industries.

China's civil society has certainly raised awareness about the ecological costs of past and present economic strategies and has thus been able, at times, to obstruct projects that would have grave and negative environmental impacts; their influence is ultimately felt, however, mostly with regard to individualized, local projects and problems and less so with regard to national and global climate and energy policies. China's autocratic political system may be more of an advantage than a hindrance to a shift in energy policies at this stage of the country's development, which will make reorientation quite a bit more difficult in future.

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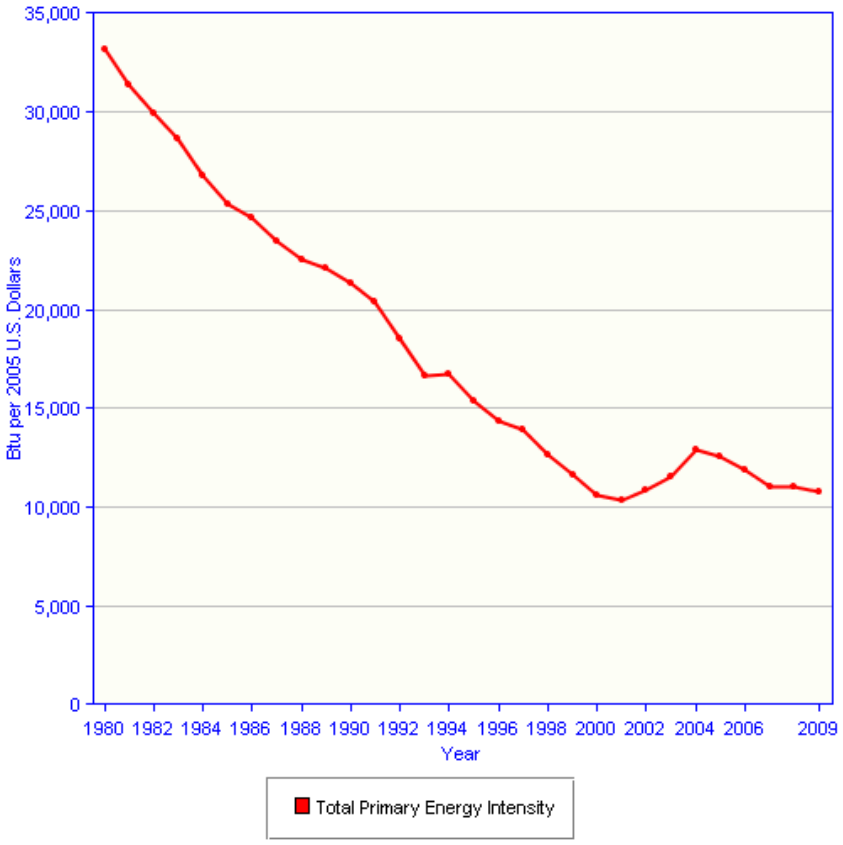
ANNEX

Figure 1: China's Total Primary Energy Intensity (Btu per 2,005 USD)



Source: Energy Administration Information (USA).

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