

Strategic choices: China's challenges of change

Joakim Nordqvist

Environmental and Energy Systems Studies
Lund Institute of Technology, Lund University
Gerdagatan 13
SE-223 62 LUND
Sweden
Joakim.Nordqvist@miljo.lth.se

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Abstract

China faces a multitude of fundamental challenges in its present state of transformation and development – in social, economic, technical, and administrative terms, etc. This paper focuses on the cross-section of three elements: (i) China's current and dramatically developing energy trends, profoundly different from projections made only a few years ago, (ii) implications, to the implementation of centrally adopted policy instruments and decrees, of China's transition from a planned to a market-based economic system, and (iii) global climate change. Putting the spot-light on the point of this cross-section reveals a turmoil of actors on a stage, where short- and long-term agendas clash, traditional governance systems fail, and different policy frameworks – local, provincial, central, regional and global – are in disarray and misalignment.

On this chaotic stage, academics and policy planners apply their analytic skills to construct scenarios and to identify key conditions for the arrival at different futures, benign or less appealing in various degrees. This paper suggests how, in failing to account for the present, these futures are often inherently flawed. In consequence, it is argued that the logic of scenario- and policy-making needs to be adapted to the logic and incentives of actual stakeholders, rather than that of modelled ones, in order to better serve as guidance to a

China that has to meet the challenges of rapid change on multiple fronts.

Viewing the future

In an initiated narrative, bringing together decades' worth of research about China, Vaclav Smil (2004) writes about the dynamics of politics and development in this constantly topical country, and about the difficulties of making forecasts to correctly predict the changes that will take place over the short- and long-term future. (While Smil uses the word "forecast", his reasoning is here understood to encompass other types of projective studies as well. A brief deliberation about forecasts and scenarios is given below, in the section *Note on terminology*.) In spite of the availability of good background knowledge due to existing infrastructures, Smil notes that "forecasters" of energy, food and environment trends often fail. Not only are the absolute numbers that are presented in such projections often completely wrong, "but their uselessness, for forecasts looking 5–50 years ahead, [...] becomes obvious in just a matter of months or a few years after their publication" (Smil 2004, 210). Still, of course, there will always be new projections or estimates made for these or any other types of important future developments. Two different sets of challenges may be addressed in this context.

- For the constructors of projections (forecasts and scenarios alike): how to identify, communicate and possibly reduce uncertainties and short-comings in their presentations.

- For their audience: how to interpret, value and use these projections constructively.

It is the former set of issues which will be dealt with here.

This paper concerns itself with the topic of China's energy future, which is an area intensely researched and the subject of many opinions, warnings, ambitions and pieces of advice. It is also a cause of grave concern for a score of stakeholders, not least, of course, for China's leadership, charged with the challenge of making the strategic choices that will shape this sector. This, at least, is how we are accustomed to view the role of the Chinese government, which maintains – also in the current era of economic transition – its image, domestically and internationally, as a decisive social engineering and planning institution. Generally, in studies and analyses of large technical systems (such as, in this case, energy supply), it is common to focus on organisations and individuals perceived to be key actors or “system builders” (Summertown 1998), and so our proneness to first see the government's “omnipotence” is easily understood. One objective of this paper, however, is to shed, in this context, a little light on some of the complexities or misconceptions, which complicate this view of the government as the primary strategic energy choice-maker and planner. The insights presented here are not novel or original. Nor will any new energy forecasts or scenarios be added to existing ones. The aim is to bring together experiences from different sources and disciplines, and to present them in such a way that a better understanding of the nature of China's energy challenges is possible.

NOTE ON TERMINOLOGY

Before going further in this paper, there is a need to address briefly a terminological issue of some importance to the subject, namely the usage of the words forecast and scenario. Sometimes used as synonyms, they may also in fact reflect two quite different approaches to the way in which we look upon the future. A forecast implies an element of prognosis and thus the concept of a high, and often quantifiable, likelihood of occurring. A scenario on the other hand need not be likely, only feasible. Scenarios, therefore, are often presented in groups which portray a span of possible futures. The arguments and discussion in this paper address the feasibility, rather than the probability, of existing projections of the future of China's energy sector. That is to say that the focus rests on the qualitative (scenario) aspect of such projections; not on the probabilistic and quantitative (forecast) ambitions, which they may – or may not – have.

Energy in China

Currently, China is in a phase of great economic expansion. All over the world and every week we receive news about the “Asian dragon” in economic journals or other media. Indeed, counted in purchase-power parity, China's total GDP is now the world's second largest after the United States (IEA 2002). Ever since Deng Xiaoping's launch of the Open Door policy in 1978, the country has been in a transitional mode, through which the elements and characteristics of Mao Zedong's planned economy are being remodelled or abandoned. A “socialist market economy with Chinese char-

acteristics” is in the making. For the first two decades of this new era, China's energy use followed a unique trajectory, increasing only moderately at half the pace of the economic expansion. This, in effect, meant that the Chinese economy's energy intensity halved in less than twenty years, as GDP figures quadrupled while energy use merely doubled. Furthermore, in the last few years of the nineteen hundreds, official statistics suggested that energy use actually receded, even in real terms, whereas the 21st century has brought on a new situation, with rapidly increasing energy use. Caution in the interpretation of Chinese energy statistics is recommended, however (Sinton and Fridley 2003). One may wonder, indeed, what is happening. And, not least, what will happen in the future.

Existing projections

Opinions on how energy use in China will develop abound. A number of thorough and solid projection exercises have been made in the recent past, and we shall dwell on two of the more influential of these: the ERI study and the China Council study. (The names indicate which institutions have co-ordinated or presented them: the Energy Research Institute and the China Council for International Co-operation on Environment and Development, respectively.) Here, “influential” refers to the closeness of both of these studies to the ears of China's central leadership, as described below. Both studies agree in the main and general conclusions that China, in the foreseeable future, (i) will continue to rely heavily on coal and fossil fuels for its energy supply, and (ii) will increase its total energy use over the coming decades. They also agree in the sense that they highlight the seriousness of the (environmental as well as economic) risks involved if China develops along the business-as-usual baselines that each of them envisions, suggesting the possibility of choosing instead alternative, and more benign trajectories. Brief descriptions of these two studies are given below.

THE ERI STUDY

The Energy Research Institute (ERI) is closely linked to China's National Development and Reform Commission (NDRC) (formerly known as the State Development and Planning Commission (SDPC)), which is a ministerial-level institution responsible, among other things, for China's recurring five-year plans. No longer enforced prescriptively, these plans still provide objectives and guidelines for authorities at all administrative levels regarding national priorities for the country's short-term development. The ERI study, referred to here, was conducted in four stages from 1999 to 2003. The first stage constituted direct input to the SDPC and the process of formulating the energy conservation component of the current (tenth) five-year plan, which covers the period from 2001 to 2005. The results of the entire study are presented in English by Sinton *et al.* (2003) as well as in a comprehensive volume in Chinese titled “China's Sustainable Energy Scenarios 2020” (Zhou *et al.* 2003).

Three different scenarios, covering the time period from the base year of 1998 until 2020, were developed in the ERI study, using LEAP (Long-range Energy Alternatives Planning system) modelling. At a macro-economic level, all three

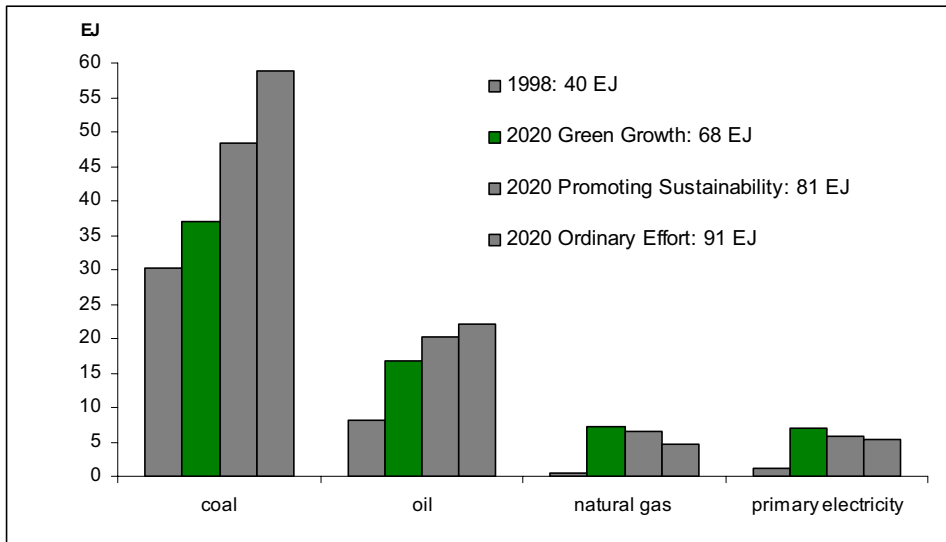


Figure 1. ERI's scenarios for China's commercial primary energy use. Source: Zhou et al. 2003, Table 7.7.

scenarios are alike in that the objective of quadrupled economic activity in 2020 compared with 2000 is met. They differ, however, in how this is accomplished. A technically and environmentally progressive future is described by the scenario called *Green Growth*, which includes the adoption and successful implementation of new and forceful policies and measures. The least sustainable of the development trajectories presented has been named *Ordinary Effort*. It is described as a business-as-usual scenario, in which economic policies are prioritised over environmental and energy-saving policies, resulting in barriers to improvements in technical performance. The middle-way scenario is called *Promoting Sustainability* and is based on an assumption that current environmental and energy laws and policies will be successfully implemented – in line with the intentions expressed in the five-year plans. An overview of the differences in outcome between the scenarios is presented in Figure 1.

It is interesting to note how in these scenarios the ERI projects China's energy use to increase by a factor in the interval of 1.7 to 2.3, whereas the economy is assumed to quadruple. Thus, the ERI suggests that economic energy intensity would continue to drop at an impressive rate, even in the least efficient case of *Ordinary Effort*.

THE CHINA COUNCIL STUDY

The China Council for International Co-operation on Environment and Development was established in 1992. It consists of Chinese and foreign experts and it reports annually to the State Council (the cabinet of China's central government). In 2003, the China Council's Task Force on Energy Strategies and Technologies presented the results of a study, in which six scenarios for China's energy future (from 1995) until 2050 were constructed. DeLaquil et al. (2003) describe how MARKAL (Market Allocation) modelling has been used to define and elaborate these scenarios, called *Base* (base technologies, i.e. business as usual), *AdvTech* (advanced technologies), *Delay* (delayed advanced technologies), *Low-Eff* (low end-use efficiency), *HiTrans* (high personal transport demand) and *Shock* (oil price shock). Unlike the ERI

study, this study includes cost aspects into its scenarios. Another difference is that the China Council study specifically highlights energy security concerns by focusing on the use and development of domestic energy resources (particularly advanced coal and biomass gasification technologies) as a strategy for limiting dependence on foreign energy sources (essentially oil and natural gas).

The Task Force report (TFEST 2003) compares the *Base* and *AdvTech* scenarios, and summarises some concrete policy advice to China's leadership and the NDRC, needed for the realisation of the latter (and preferred) development path.

For 2020, the China Council study scenarios suggest different values for China's primary energy supply, but interestingly they do not differ significantly from what is projected by the ERI (cf. Figure 1). In the *AdvTech* and *Delay* scenarios, as indicated by DeLaquil et al. (2003) approximately 70 EJ will be needed. In the *Base* case, energy supply is only slightly higher, nearing 80 EJ, whereas in the *LowEff* scenario it climbs closer to 90 EJ. (The *HiTrans* energy system is said to be similar to the *LowEff* case, and the *Shock* scenario differs from *Base* mainly in terms of cost.)

Discussion

The sustainability problems connected to the images of China's business-as-usual energy future, as given by the two studies above, are serious. However, both studies suggest that strategic choices can be made, which may turn the development away from these baselines. The making of such choices represent China's challenges of change. This section discusses these challenges from a few different perspectives.

CURRENT TRENDS

In ERI's scenario *Promoting Sustainability* it is assumed that China's Energy Conservation Law is upheld and implemented so that "the energy efficiency of technologies in all sectors and industries [...] is on the way to reaching levels currently prevailing in advanced industrialized countries by 2030" (Sinton et al. 2003). For China, being an economy in

transition and experiencing tremendous economic and industrial growth, electric power becomes an increasingly important part of the energy system. Coal is, and will most likely remain, the predominant source of electricity produced in China, and efficiency and cleanness need to improve in this sector. This is important, not least since power production facilities have long economic life-times, and it is easier to achieve high performance in newly built facilities than in retrofitted or modernised existing plants. According to the China Council study, there is now, in the early years of the new century, a unique window of opportunity: of the coal-fired electric capacity expected in 2020, some two-thirds will have been installed after 2000 (TFEST 2003). It follows that China's leadership could, indeed it has to, take this remarkable chance to influence how future electric production capacity is composed by promoting modern, advanced, efficient and clean facilities. And the leadership agrees. According to policies and plans, outdated, too small or too inefficient electricity-producing units shall be phased out. Only the establishment of satisfactorily modern plants will be allowed. Indeed, the same kind of policies apply to other sectors as well: coal mining, cement production, *etc.* Already in 1998, the (now dismantled) State Economic and Trade Commission clamped down on underachieving and substandard industries, forcibly closing a great number of different types of enterprises – at least formally and in the statistics. However, problems with enforcement and compliance in these kinds of cases are common in China. This is well known also to China's central leadership and planners, and consequently the ERI did not present *Promoting Sustainability* as its business-as-usual scenario. Instead, *Ordinary Effort* represents the baseline in which deviations from national five-year plans and other policy declarations are expected. The message, of course, is that action is needed.

Today, however, trends in China's electricity demand differ from plans and scenarios – not marginally but very much indeed. Massive shortages of electricity (due to bottlenecks in fuel logistics as well as to lack of installed production capacity) have led to rationing and brownouts in several parts of the country (Sandklef 2004). This, in turn, leads to a situation anticipated neither in the current five-year plan nor in scenarios (such as those by the ERI and the China Council). Presently, investments in electric power production soar as local actors seek to secure their supply. The guiding principles of these actors are quick, cheap and easy, rather than modern, clean and efficient. Thus, the envisioned window of opportunity for new, best-available technologies, as mentioned above, runs the risk of being filled-out instead by more-of-the-same and substandard technologies. The boom resounds in other sectors as well: the number of small, unsafe and policy-contrary coal mines is rising, the production of building materials in substandard facilities keeps growing, *etc.* And so, the (presently) near future seems decreasingly similar to the (described) future in any of the projections presented above; even the more cautious ones. It seems as if these scenarios have all failed to account for something in the link between the recently transpired (at the time of construction) and the possible events of the near future. In qualitative projections without claims to probability this is not necessarily a problem. As discussed above, scenarios don't intrinsically make claims of being likely, which

is how they differ from forecasts. However, according to both the ERI and the China Council, their studies are meant to provide assistance and input to China's environmental and energy decision-makers. If recent and current developments already in this early stage move too far off from the whole span of possibilities as projected in the studies, these scenarios run the risk of quickly losing their value as counsel. The quote above from Smil regarding the shelf-life of forecasts threatens to be applicable in these cases as well.

WHO ARE THE DECISION-MAKERS?

In this section, we take a closer look at one of the possible causes for the apparent disjointedness between the span of possible near futures (as described in the two scenario studies) on the one hand, and the recent trends in China's energy use on the other.

There is a rich flora of literature about the structure and workings of Chinese administration, and about the conflict in China between what is sometimes called "the rule of law" and "the rule of man". *Zhifa nan* ("it is difficult to uphold the law") is a common phrase within the Chinese legal context (van Rooij 2002). One piece of learning which can be extracted from different writings in these fields, and which may be an eye-opener to the unfamiliar China observer, is how the concepts of hierarchy and consensus both apply within Chinese decision-making. They might otherwise easily be seen as mutually exclusive. Hierarchy is an important characteristic of China's cultural Confucian heritage, which demands loyalty and obedience from the part of subjects, and concern and fairness from the part of rulers. Subordinate disagreement or defiance, however, cannot be tolerated: it must either be quelled by the leadership, or – when coercive means are not wanted or available – ignored. Hence, there is a widespread culture in China of feigned compliance (Pye 1992), which allows an outward show of unity and harmony, even when conflicts of interest do occur between hierarchical levels. And there are many such levels within China's huge administration. At the same time, however, there is also a multitude of actors on each of these administrative tiers, competing for influence over many of the same policy areas. Pye (1992) points out how consensus leadership constitutes a public imperative, an iron law, practised to avoid such conflicts of interests which might otherwise endanger the image of Chinese unity. This need for agreement among same-level authorities can make Chinese decision- and policy-making extremely slow and opaque. As a result of these processes, the "omnipotence" one might have expected to find in the possession of China's central leadership is not an accurate representation of the factual situation. Displays of real power are possible but will only be shown in cases where examples need to be set, or where there is fear for a grave threat to society's stability. In the cases of environmental legislation, or of other long-term directives and policies that may be perceived as detrimental to local stakeholder priorities (such as employment or short-term economic or political gain), successful scenario-making needs therefore to expand the cast of actors far beyond the central leadership so that it includes many more interests. The strategic choices actually made regarding China's future rest not solely in the hands of government institutions in Beijing. This observation has become increasingly true as

market reforms have progressed, and as local actors (in both administration and industry) wield more and more influence over decisions, the making of which was once the formal privilege of the central political elite and of the State Planning Commission. Nevertheless, traditional structures remain, and the framework of hierarchical consensus continues to play an important role. This means that divisions in opinion among the various significant stakeholders remain hidden, and that deviations from central policies (be it the reopening of a closed coal mine, or the installation of new but outdated power production units) can often be carried out without preceding discussions or impact assessments, and without ensuing sanctions.

CLIMATE DIMENSIONS

As discussed above, omitting considerations of relevant actors from energy scenario-making might induce flaws in the assumptions that link the near future to the present and recent past. In addition, the climate change issue can serve as an illustration of a connected dilemma; namely stakeholders' multiple concerns and agendas. Climate change, being a global problem and a subject of international negotiations, has become a sensitive issue for China, where it may be regarded from the three different perspectives of science, domestic policy and foreign policy (Nordqvist 2005). These climate dimensions interact with each other, and moreover they interact with actors' views on energy issues – adding new stakeholders to the energy arena as well, such as the Ministry for Foreign Affairs. All of this complicates matters in several ways, not least by tying China's domestic energy situation to an internationally controversial issue, which, for some influential Chinese actors, is highly connected to national prestige.

Concluding observations

China's current leadership claims that it recognises the problems of unsustainability, which threaten to tap the country of ever increasing portions of its future welfare. The energy sector is a centrepiece in this context, with direct links and feed-backs to environmental, economic and social factors. Influential advisory institutions have suggested that baseline development trajectories will aggravate the situation, indicating also that alternative futures are possible if the situation is properly addressed. Still, current trends suggest that the country might be headed in a direction which could bring even graver consequences than projected baselines. In order for scenario studies to provide better guidelines for policy-making in the future, this paper brings forth two seeds for thought.

- While scenarios are not to be interpreted as forecasts, their potential to remain helpful to policy-makers ought to increase if the span of futures that they portray includes likely (and actual) short-term development trajectories. Where the behaviour of actors is an input parameter in scenario-making, one should remember that various actors have different rationale for their actions. China may still be an authoritarian country, but this does not mean that the policy-makers of the central leadership are the only ones who influence the strategic de-

velopment choices that are actually made.

Independently acting (local) stakeholders should also be accounted for. This is an important challenge. Furthermore, it would be helpful to acknowledge also that interest variances occur *between* and *within* China's administrative tiers.

- There is also need for appreciation of the cross-relationship between various topics. One implication of this observation is an awareness of the fact that an actor may have conflicting stakes in connected issues. Such situations certainly complicate inter-actor alliances and other relations, as well as actors' proneness to engage or respond rationally (as seen when topics are regarded in isolation). In the case of energy, climate change is such a connected policy area.

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