

Fighting Windmills?

Green Energy Presence in Chinese Energy Security Literature

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Abstract

This thesis constructs a comprehensive overview of the published academic energy security literature in China during the 12th five-year plan period, with the goal of determining the presence of green energy development in this literature. A framework is constructed to categorize the theoretical approach to energy security of a text, and for quantifying the attitude towards green energy development as part of energy security theory. The study concludes that the published literature as a whole is very varied, spanning from very restricted to very comprehensive definitions of energy security. The study also finds that literature with a more comprehensive energy security definition are more likely to make green energy development considerations. Although a large portion of the published literature does not make green energy considerations, the literature that do generally view green energy development as contributing to the overall energy security. A discussion is presented about possible deciding factors of the focus of energy security literature.

Preface and Acknowledgements

“Finally, from so little sleeping and so much reading, his brain dried up and he went completely out of his mind.”

- Miguel de Cervantes Saavedra, Don Quixote

First, I want to thank my teachers at the University of Oslo, in particular my supervisor Anna Lisa Ahlers. Thank you for your support and for putting up with my relative approach to the concept of deadlines. I want to thank all staff and faculty of the Nordic Institute of Asian Studies. Our shared coffee break discussions went a long way in outlining this thesis. I also want to thank John Jonston and Archibald Campbell, for their strong encouragement in times of despair.

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Aslak Celius, May 30th, 2016

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1. Introduction

According to the International Energy Agency, China's total energy consumption reached 2,2 billion tons of oil equivalent in 2009, making China the world's biggest consumer of energy, ahead of the United States (Ceng 2011, 52). China is not expected to experience zero-growth in energy consumption until after 2035, at which point it will have passed 4 billion tons of oil equivalent.

At the same time, China is experiencing massive environmental challenges, ranging from air and water pollution to waste management issues. China's large dependency on coal in energy generation is being put forward as one of the primary contributors to China's pollution problems. In order to address its environmental problems, China must decrease its coal-dependence. As presented in a study by Hao et al. (2015), China's growth in coal consumption is expected to decrease by 2020. In order to decrease coal-dependence without sacrificing energy supply, other sources of energy will necessarily have to fill that gap. Within the Chinese energy policy community, some, such as the Energy Research Institute, advocates for that gap to be filled by the cleaner fossil fuels, other wants to focus on renewables, mainly hydro- and wind power. More critical voices argue against a reduction in coal dependency, all together, giving energy security precedence over environmental considerations (Downs 2004, 24–29). Between 2004 and 2014, consumption of renewables in China rose from 0.9 million metric tons oil equivalent to 53.1 million metric tons in 2014. By then the share of renewables of China's energy consumption had reached 16.7 %, with the consumption of increasing by 15.1 % from 2013 (BP 2015b). The growth rate of the consumption of oil, natural gas and coal between 2013 and 2014 was at 3.3 %, 8.6 and 0.1 % respectively (BP 2015a). This demonstrates that the matter of green energy development in China is not a question of 'if?' or 'when?', but rather of 'what magnitude?'

One important question moving forwards is how China will address what are arguably the two greatest challenges in Chinese energy policy; 1) ensuring energy security while the demand for imported energy sources increases; and 2) moving Chinese energy generation off coal, thereby decreasing dependence on fossil fuels in favor of a more environmentally sustainable energy generation. The people charged with answering modern China's cry for energy must be able to distinguish the windmills from the giants. Does the energy security community in China view a move towards an increase in green

energy development as a threat to China's energy security? Or are the contributions of green energy development to China's energy security seen as outweighing the sacrifices made in terms of potential loss of control over energy resources? To answer this, I review current Chinese literature on energy security to see how energy security scholars approach the question of green energy development.

Having to think about energy security is a relatively new practice in China. After all, China only became a net importer of oil in the mid-90s. Thus, Chinese energy security theory can, prior to this time, for the most part, be summarized in one word: "self-sufficiency". Whereas, western energy security theory is a school of thought that can be traced back to before WWII, energy security theory is still a young field of study in China. It makes for an interesting case to study. Do the Chinese energy security community follow the same development pattern as the western did and adopt an oil-centric approach, strongly influenced by realist power politics, early on? A zero-sum battle for the resources? Or do we observe a move towards a more contemporary comprehensive approach to energy security theory, making broader considerations than merely the control of natural resources?

In light of these questions, the balancing act between energy security and green energy development is very interesting. As an example, by one energy security interpretation, switching central heating in major cities from coal to natural gas would be a major faux pas, as China would have to import said natural gas, and increasing the dependence on imported energy resources reduces energy security. Conversely, according more comprehensive energy security theory, installing better insulating in existing housing can be viewed as an energy security move, as it lowers the demand for heating, and reduces the environmental costs of keeping warm. *How* Chinese academics think about energy security, not simply *what* they think about it, will determine how China balance energy security interests and green energy development in the coming years.

Much academic work is being done on Chinese energy security, both within and outside China. However, with the majority of the international energy security community being non-Chinese speakers, they are practically being cut off from an entire side of the academic debate about Chinese energy security – namely the domestic academic debate.

The current Chinese leadership has signaled an increased influence of the academic community onto policy-making. Both through an increased use of academic-political

think tanks, and through the recruitment of academics into government positions. With academics playing an increased role in Chinese decision-making, the academic debate concerning subjects such as energy security becomes increasingly relevant in the study of Chinese society and politics. (Huang 2015; Qiu 2015)

Besides this assumed increasing importance of academia in Chinese policy-making, I believe this topic also touches on the role of sinologists in western academia. As foreign sinologists, I wholeheartedly believe that our greatest purpose is bridge-building. Providing access. While a review of the domestic literature of one narrow field of academic work may not be inherently valuable, or even very interesting, its real value comes through when it is used as a part of greater works. My work can provide another side to consider – a side which was earlier inaccessible to the majority of the energy security community.

1.1. Research statement

In order to structure a comprehensive overview of Chinese academic work on energy security, I present the following pair of research questions.

1. Do the Chinese academic community subscribe to a more restricted or more comprehensive understanding of energy security?
2. How does Chinese energy security literature approach the topic of green energy development?
3. What decides the focus of energy security literature in China?

I hypothesize the following:

- The Chinese academic energy security theory debate is more diverse than Chinese energy policies would suggest.
- Overall, Chinese scholars have a positive attitude towards the effects of green energy development on energy security.
- There is a correlation between the scholarly understanding of the concept of energy security and said scholar's attitude towards green energy development.
- Scholars with a more comprehensive definition of energy security will be more likely to consider green energy development as promoting energy security.

2. Methodology

2.1. Theory and relevant literature

2.1.1. Theoretical background

Daniel Yergin was one of the earliest theorists on energy security, and his original definitions are still being applied today. However, as Yergin himself expresses, the subject must be rethought and adapted to fit today's energy security environment (Yergin 2006, 69). This is especially relevant in China, where energy security up until relatively recent times has been equated with self-sufficiency (Downs 2004, 23). Downs goes on to describe Chinese energy security thinking as oil-centric and rooted in realist power-politics. It is a zero-sum competition for natural resources.

The core objective of a country's energy security policy is, according to Yergin, to *"assure adequate, reliable supplies of energy at reasonable prices and in ways that do not jeopardize major national values and objectives."* (Yergin 1988, 111). Yergin adds that for developing countries like China, it is also about adjusting to the global markets, and how market dependency affects their trade balance (Yergin 2006, 71).

Yergin presents a series of principles on which maintaining energy security hinges. The first is a diversification of supply. This can be interpreted in more than one way. One interpretation is a diversification of energy sources, whether it's oil, gas, coal or alternative energy sources. Another version of diversification is to diversify the supply, and not rely on a single supplier for your energy resources. The second principle is resilience – having flexibility in your system to overcome shocks and recover from disruptions. The third principle is market integration, the realization that there is only one energy market, and that security hinges on the stability of this market. The fourth principle is the importance of information. The availability of information is a prerequisite for a stable market (Yergin 2006, 77–78).

Another important point of Yergin's is that modern energy security strategy must look past the traditional focus on supply alone, and be expanded to include the entire supply chain (Yergin 2006, 78). This means not to just focus on the supply of oil and gas, or the generation capacity of electricity, but also to include the oil transportation and refining system, power distribution infrastructure.

The argument for energy security and green energy development to be pulling in the same direction can be found in this last point of Yergin's, as well as in the first interpretation the diversification of energy supply. Thus, in order for a focus on green energy development to coincide with emphasizing energy security in energy policy, the energy security community must adhere to this interpretation of energy security theory.

Outside of the work of Daniel Yergin, the field of energy security has become too vast to recount in full. The following is therefore a presentation of literature that represent different approaches within the field.

Traditionally, 'the reliable supplies of energy' has been understood as the reliable supply of oil. This makes a lot of sense. First, it has to do with what constituted security in the second half of the 1900s; the military security of your country's sovereignty. As I will come back to, this understanding of the term security will be a determining factor in one's understanding of energy security. Oil was a necessity in driving the war machineries of the great powers of the world. Secondly, to industry-driven economies, oil was increasingly important to maintaining production and transportation, and thus vital to the economic security of a country.

The link between energy security and military security is exemplified in Darwin C. Hall's "Oil and national security" (1992). With the backdrop of the (first) Gulf War, Hall discusses the impact of the oil price on military spending. Interestingly, in what is almost a side note, Hall also becomes an early proponent of investments in alternative energy research and development as an energy security tool.

As exemplified by de Carmoy (1986), when defined as oil security – or the security of fossil fuels in general – energy security fast becomes a zero-sum game. As there is a finite supply of non-reusable natural resources, one must give up a good for another to have it. With this economic way of approaching energy security, and with the rather unpredictable nature of middle-eastern oil supply, Yergin's principle of supply diversification was prominent, and very much defined as having multiple suppliers of crude oil. Furthermore, this zero-sum oil-centric understanding of energy security expands the relationship between energy policy and military policy. In addition to access to energy being part of deciding a country's military power, military force was also introduced as possible tool for ensuring said access to energy (Maechling 1982). There are clear similarities between the American struggles connected to Arab oil in the 1980's and China's own logistical

challenges connected to overseas oil. Although Maechling concludes that the situation ultimately needs a political rather than logistical solution, the logistical and military tools mentioned are being discussed and utilized in regards to the Taiwan strait and overland pipelines through central Asia.

Yergin's suggested practice of stockpiling is being is also being promoted by the same voices, particularly in relation to reliance on Arab oil. Zweifel and Bonomo (1995) addresses stockpiling, and argue that stockpiling of oil alone is not sufficient to protect from energy shortfall. They claim it is necessary to move "...energy security policy away from addressing one source of energy at the time...". (Zweifel and Bonomo 1995, p. 183) They are however, talking specifically about a switch to natural gas, rather than renewables, an energy source steered by the same supply and pricing mechanisms as oil.

The role of renewables in energy security is discussed by George C. Georgiou in a 1993 article on US energy security. He problematizes the dominance of Middle Eastern oil producers in the international petrol market, yet dismisses energy conservation and fossil fuel substitution as unlikely to increase US energy security in the short term (Georgiou 1993).

These contributions all share some common elements, and thus represent one side of energy security theory; they are overwhelmingly centered around oil, there is a zero-sum understanding of resource acquisition and they focus exclusively on the supply side of the energy system. In general, they also consider energy security a national issue. Expressed plainly, the goal is to increase your country's share of the finite natural resources in the world, rather than increasing the total amount of available resources in the world.

Cherp et al. (2013) conducts a study of the effects of long term climate policies on energy security, and finds that such policies will benefit a country's energy security in the long run. This is primarily attributed to reduced energy trade, and diversification of energy supply. In contrast to their 20th century counterparts, Cherp et al. defines diversification of energy supply as diversification of energy sources, not energy suppliers.

However, there are also those who claim that green energy development must come on at the cost of energy security. Gracceva and Zeniewski (2014) creates a framework for analyzing the costs and benefits of a low-carbon energy system to energy security. In their own words their "...analysis has provided a more nuanced alternative to the prevailing

assumption in the existing literature that a low-carbon system – by virtue of increasing primary energy diversity while obviating the need for imported fossil fuels – can increase the robustness of the system.” (Gracceva and Zeniewski 2014, p. 347)

The counterpoint to viewing energy security purely by the nation state – each country has its energy security – is to consider energy security a global phenomenon. When considering energy security globally and not nationally, the goal becomes to ensure a *sufficient supply of energy on the world market*, rather than for each country to strive for *a sufficient share of the offered energy on the world market*. This approach changes the zero-sum nature of energy acquisition, as the understanding is founded on the mutual benefit of all actors of increasing the total amount of available energy. It also makes it possible for one actor to increase his gross energy consumption without the cost to the other actors in the energy system. In his discussion around the conceptualization of energy security Chester (2010) I find an underlining understanding of energy security as a global concept throughout the article, largely connected to the role of the international resource markets in deciding energy security. Verrastro and Ladislaw (2007) work along some of the same lines, in terms of focusing on the interdependence of the modern world. They argue that as the energy system becomes more and more interdependent, the links between energy and foreign policy will be strengthened, as energy security as a practice becomes more and more complex.

Benjamin K. Sovacool has been at the forefront of developing what he labels a ‘comprehensive’ or ‘synthesized’ approach to energy security theory. This is perhaps the most extreme counterpart to the more limited understandings of the late 1900s (Sovacool 2011; Sovacool and Mukherjee 2011). By breaking energy security down into 20 components distributed among the five dimensions of availability, affordability technology development, sustainability and regulation, Sovacool and Mukherjee not only address both the supply- and consumption sides of energy security, but also account for the environmental and social costs of energy acquisition.

Christian Winzer (2012) tries to create a modern concept of energy security through reviewing energy security literature. He argues that the concept of energy security should be narrowed down to a concept of ‘energy supply continuity’, because other traditional energy security goals are now covered by other policy areas. He is, then, restricted in his

definition of the goals of energy security, but more comprehensive in his understanding of the tools that can be used to ensure energy security.

These two latest examples of Sovacool and Winzer demonstrate that today's energy security theory is not a homogenous entity. Where the former expands on the definitions of their predecessors, the latter narrows them down the definitions in certain parts of the approach and expands them in other. I would also like to make an argument based on my own observations of the development of theoretic energy security literature. I have observed a shift in focus and intention of energy security theory over the last decades. It has in some ways become more analytical in nature. Whereas the energy security theory of the 1900s carried the stated intention of finding ways of 'ensuring' or 'protecting' or 'achieving' energy security, today's theoretic literature tends to be more along the lines of creating frameworks for 'assessing' or 'measuring' a country's energy security. At this point, explaining this shift would be no more than speculation, and the claim of this shift is itself only based on anecdotal evidence. Still, it will be interesting to see if the Chinese literature on the energy security is of a more practical or analytical nature.

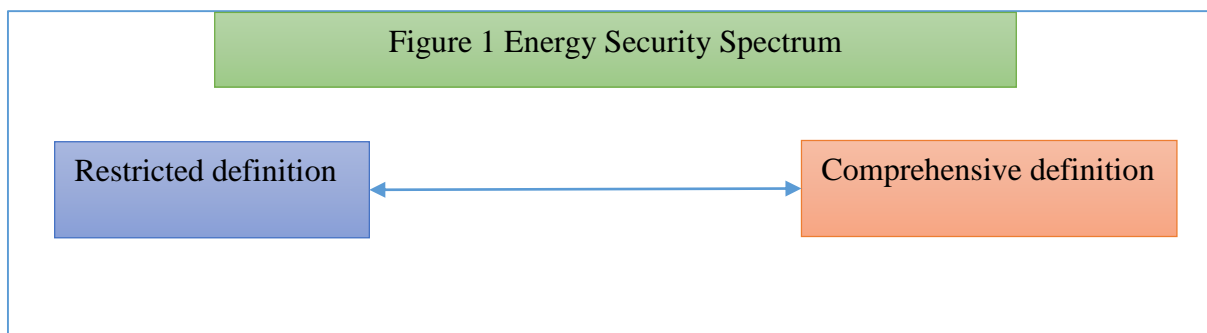
2.1.2. Building an energy security framework

In order to effectively use the theoretical approach to energy security as a variable in this study, a framework must be created that allows for said approach to be quantified at a later stage of the study.

In his monograph "China Goes Global – The Partial Power", David Shambaugh creates a left-to-right spectrum to illustrate the different approaches of the participants of the Chinese foreign policy debate, ranging from Nativism to Globalism (Shambaugh 2013). Such a spectrum of the theoretical approaches to energy security would serve as an ideal framework for this study. However, due to the multitude of approaches and theoretical backgrounds that makes up energy security theory, this would be difficult. For one, energy security theory doesn't have the same established "schools" as the studies of international relations, but rather grew out of one such school. Since then, theoretical contributions have come from all over the social sciences. Secondly, if you were to categorize the approaches into "schools", it would be less than intuitive to range them in a left-to-right spectrum.

For these reasons, I have opted to go with a floating spectrum. Rather than a series of ranked schools, this spectrum features two extremes, where most approaches will be

situated somewhere between them. One of these extremes is a term already coined by a group of contributors to energy security theory; the comprehensive approach. On the other side of the spectrum, its antonym; restricted.



I find that a spectrum ranging from a restricted approach to energy security to a comprehensive approach is both inclusive, precise and descriptive. Inclusive, because just about all approaches should fit somewhere between these two descriptions. Precise, because there is no need to make the individual contribution fit into some labeled “box” in order to place it on the spectrum. As will be seen from the study, it is very possible for someone to have a restricted definition of what energy sources decides a country’s energy security, and at the same time have a comprehensive approach to how oil security can be obtained. Conversely, it is possible to have a comprehensive approach to the energy sources but a very restricted understanding of how to increase energy security. The sum would, in both cases, place each approach somewhere between the two extremes. Finally, such a framework is descriptive, because placing a contribution on this spectrum would immediately tell the reader something about its approach to energy security.

2.2. Research method

This research project will be a literary review of Chinese academic literature on energy security with the intent to determine the level to which green energy development and environmental policy measures play an active role in Chinese academic energy security approaches. The first step is to make a selection of literature. As I want to research the current energy policy climate, the articles should be published during the past 5-year plan period. As I am not looking for change over time, the distribution of publishing dates is of no concern.

This review article serves two purposes. One is to provide an in-depth review of Chinese literature on energy security theory, and the presence of green energy development in said literature, in English. I hence review the primary message of each article. Secondly, I

want to use this review to establish if there are any overlapping interests expressed between the fields of green energy development and energy security in China, as suggested by modern energy security theory, or if these two fields view each other as mutually exclusive.

I will now, once and for all, address the elephant in the room: why only study academic energy security literature, and not official policy documents. The reason is that with this thesis, I wish to capture how the Chinese academic community think about energy security. As emphasized by both Shambaugh (2013) and Downs, (2004) the vertical and hierarchical nature of Chinese policy making causes that the final policies poorly reflects the breadth of the underlying debate. It merely presents the winning argument. This means that, hypothetically, while Chinese energy security policy could be near nativist in nature, adhering to a very old-school interpretation of energy security theory, there could still be many and strong voices in the academic community propagating a more comprehensive approach to energy security.

Whereas a study of policies – the end result, if you will – may seem inherently more interesting and useful, one should not underestimate the value of charting the theoretical debate as well as the real politics of an issue. Such a study will be of great interest, for instance when discussed in the context of the relationship between government and academia, or when conducting more abstract studies the development of academic theory in China. My wish is for my thesis to provide an insight that will be of use to others doing more comprehensive studies.

United Nations consultant Zhibo Qiu writes in an article in the Jamestown Foundation publication China Brief about this phenomenon. Qiu writes about what he describes as a revolving door for academics into government positions. This revolving door is a metaphor for the active and targeted recruitment of academics into government positions. (Qiu 2015) Qiu further describes what he calls the three waves of professional background of the party leadership. The first wave was the founders of the republic, with a revolutionary and military background. The second wave was started by Jiang Zemin, and later followed by Hu Jintao, of technocratic officials with engineering backgrounds. The third wave was introduced with the current administration, whose academic and professional backgrounds emphasizes the social sciences.

Besides direct recruitment of academics into government positions, the current leadership has also worked to improve academia-government communications through the establishment of both governmental and academic think tanks, although the effectivity of these can be discussed. (Huang 2015)

Taking into consideration that the very academics who have been writing about energy security over the last few years could very well be the people making policy decisions in the years to come, this study provides interesting insight into the energy security understanding of China's future decision makers. Adding the fact of the improved position of the social sciences among Chinese leadership only strengthen its relevance.

This thesis applies a mixed method approach to the review of Chinese energy security literature. I provide a qualitative review of a sample of articles picked from a pool of journal articles. I will also be collecting metadata on the overall leanings and theoretical alignment of a larger sample of articles collected from the same pool.

2.2.1. Operationalizing the research questions

To answer the first research question, I apply a framework originally developed by Leung, Cherp, Jewell, & Wei (2014). They originally developed this framework for the study of the securitization of energy supply chains, and applied it to Chinese energy security policy. They comment in their research paper that they see their new framework as applicable for studying energy security policy in other countries, but I also see it as a good starting point for analyzing energy security theory. After all, the theory and the practice address the same questions challenges.

Leung et al. (2014) claim that “...successful securitization rhetoric should identify an energy supply chain that can be portrayed as (a) vitally important, (b) highly vulnerable and (c) possible to protect.” From this, they come up with three questions that should be convincingly answered:

- 1) What to protect?
- 2) From what risk?
- 3) By what means?

I argue that by removing the context of energy supply chains, and apply the same questions to a piece of energy security literature, the answers would give a good indication on how the author of said literature approach energy security. If the answers are “the

supply of African crude oil”, “shipping blockades in the South China Sea” and “increased military spending”, you are most likely dealing with a classical interpretation of energy security. On the other hand, if the answers are “a stable generation of electricity”, “the social costs of pollution from coal power plants” and “preferential treatment of wind energy producers in the electricity market”, you are likely dealing with someone who adheres to a more comprehensive definition of energy security.

I therefor apply these same three questions to each of the pieces of literature that review. The answer of each question corresponds to a numerical value of -1 (restricted), 0 (neutral) or 1 (comprehensive). This will result in an aggregate score of between -3 and 3, which will be used when presenting the collected meta-data.

As for the other variable, attitude towards the effect of green energy development on energy security; it is given a numerical value between -2 and 2, with 0,5 points increments. Here a 0-value is a neutral value, as it is given to those contributions who do not make a mention of green energy, or express no stance in the matter. In the context my hypothesis; “Overall, Chinese scholars have a positive attitude towards the effects of green energy development on energy security.”, a value of 0 would mean that they are not positive – a negative result. A score of -2 means that green energy development is *detrimental* to a country’s energy security. -1 means that green energy development *hurts* the energy security of a country. A score of 1 means that green energy development *strengthens* a country’s energy security and a score of 2 is given where the attitude is that the energy security of a country *hinges* on the further development of green energy.

I use the following definition of green energy development: “any energy measures taken by a government with the intention of lowering the environmental cost of energy generation.” This includes the intuitive measures such as investing in alternative energy, increasing energy efficiency and researching cleaner technology; but also less intuitive measures. One example of such a measure is increasing the share of natural gas in the Chinese energy system. Natural gas is, of course, a fossil fuel and not inherently environmental friendly. However, when China invests in natural gas for electricity generation or heating in order to replace the far more polluting coal, I define this as green energy development.

2.2.2. Source selection

The scope of this literature review will have certain limitations. Firstly, I will only be reviewing literature from within the social sciences. The topic of green energy development is absolutely an interdisciplinary field, and the same can arguably be said about energy security. However, the theoretical framework of this thesis, with its the work of Daniel Yergin at its core, is firmly founded within the social sciences.

The collection of Chinese academic literature is done through keyword searches in the National Social Science Database (国家哲学社会科学学术期刊数据库, *Guójiā zhéxué shèhuì kēxué xuéshù qíkān shùjùkù*). In selecting the database or databases to be used, two options were considered. The aforementioned National Social Science Database and the Chinese Academic Journals Database (中国期刊全文数据库, *Zhōngguó qíkān quánwén shùjùkù*). When the National Social Science Database was chosen, it essentially came down to weighing practicality against the potential width of the database search. The two databases were tested against each other with a preliminary keyword search. The keyword used was “能源安全” (*Néngyuán ānquán*, energy security) and I searched publications after January 1st, 2011. For the Chinese Academic Journals Database, the search was limited to publications within the relevant social sciences. In terms of number of hits, the Chinese Academic Journals Database outscored the National Social Science Database 620 to 179. However, whereas the Chinese Academic Journals Database yielded a much higher number of hits, the share of useful hits was significantly better in the National Social Science Database, as it does not include technical and economic literature. This is even more prevalent when searching for a topic like green energy development, as the contributions from the hard sciences in particular are much larger. Furthermore, the National Social Science Database interface is much more practical in the next stage of the database search – combining keywords and sorting the hits. Therefore, the National Social Science Database will be the primary database used. The Chinese Academic Journals Database may be used to supplement the final selection.

2.2.3. Sampling and selection

The selection of literature to be analyzed was conducted in three stages, and was a combination of selection and semi-random sampling.

The first stage is to sort through the entire pool of literature obtained through the keyword search in the National Social Science Database (国家哲学社会科学学术期刊数据库),

searching the phrase 能源安全 and limiting the search to literature published between 2011 and 2015. Based on the topic tags provided by the author as well as title, and, in some cases, abstract, the literature is sorted into 5 strata. These strata are the basis of the semi-random sampling conducted in stage two. The literature is stratified after a single variable. This variable is called “academic approach”. The various groups are “environmental policy”, “energy policy” “security policy” “economic/trade policy” and “none of the above”. Each of these categories corresponds with the approach of the author, except from the “none of the above” group, which consists of any literature that was turned up in the keyword search but not relevant to the study. This group is not part of the two latter stages of the literature selection.

The choice to do a stratified sampling in the second (quantitative) stage of the study is to reduce the chance of sampling errors based on the academic background of the authors when limiting the amount of reviewed literature. The choice of the stratification variable is based on the assumption that the academic background of a scholar will influence said scholar’s definition of energy security. The relative low cost of stratifying the selection compared to the gains of making a more representative analysis makes stratified sampling the ideal for this stage of the study (Hellevik 1991).

At the second stage, I make a representative stratified sample of 30 articles from the pool of literature. These are used in the quantitative part of the study to create an overview of the distribution of attitudes towards green energy in the security theory, as well as the understanding of the term energy security. In addition to the stratification, the sample are also weighted after a second variable. In order to get the sampling as representative as possible, I use a dichotomous variable named “oil-centric?”. In order for an article to be assigned the positive value 1, only oil and natural gas must be considered as viable energy sources in the energy security context. All other will be given the negative value 0. The reason why natural gas can be considered along with oil is that natural gas faces the same structural challenges in terms of transportation and market mechanisms.

The weighted sampling is necessary because oil-centrism as a variable is independent of the academic approach variable, but under the assumptions of this study equally influential on a scholar’s understanding of energy security.

In the third and final stage, 10 pieces of literature are selected from the previous sample of 30. These will be reviewed in greater detail. These are selected rather than sampled, in

order to get a selection that represents the different sides of the academic debate. The selection is made to represent the distribution of attitudes presented in the quantitative part of the study.

3. Survey results

In the following chapter, I present the results of the two qualitative stages of the study. As the in-depth analysis of the results is part of the discussion, which has been given a chapter of its own, this chapter only contain a presentation of the findings, without any discussion to speak of. The exception to this rule are observations made during one stage that affect the latter stages of the study. These are summarily commented. This is most prevalent when presenting the findings during stage one of the study. The reason for this is that stage one, in addition to providing the foundation for the stratification for the sampling in stage two, also serves as exploratory research and may uncover some trends worth exploring further during stage two and three.

3.1. Stage 1

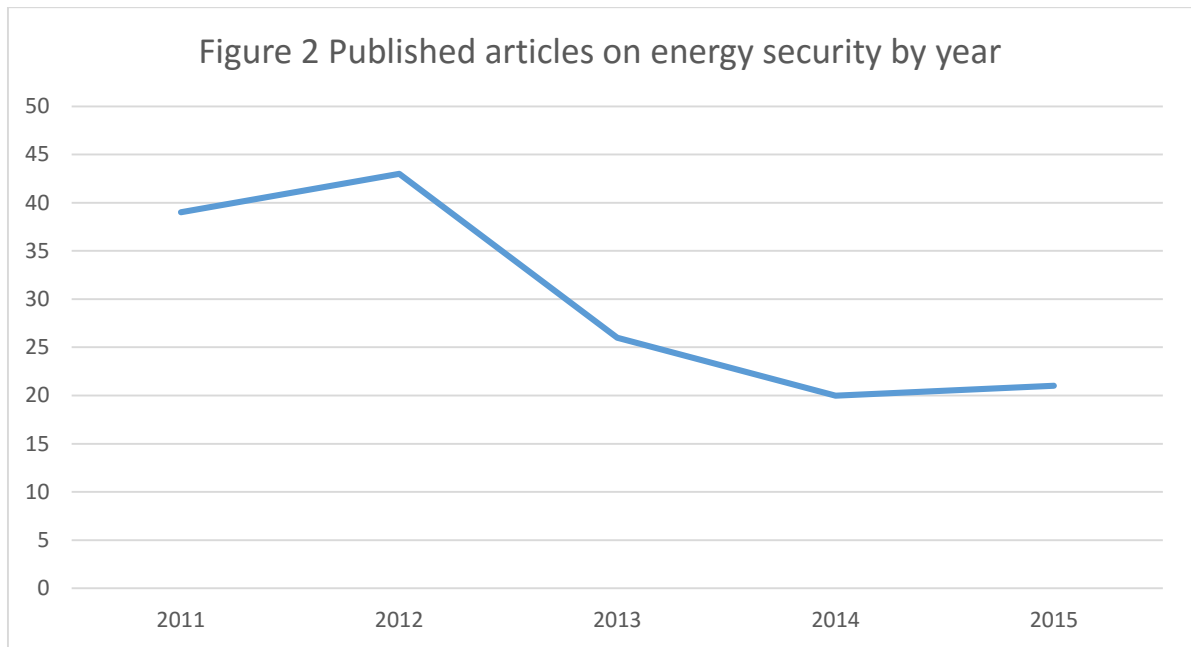
Stage one of this study is, in essence, a quick survey of the entire universe of subject prior to the sampling in stage two. The universe was defined as follows:

- Academic articles published in Chinese journals between 2011 and 2015.
- Indexed in the National Social Science Database
- Includes the phrase “能源安全” in either title, abstract or topic tags.

In practice, that meant doing a keyword search for “能源安全” in the National Social Science Database, within the parameter of articles published between 2011 and 2015. This search yielded 168 hits. Of these, two were duplicates, leaving us with 167 unique articles (n=167).

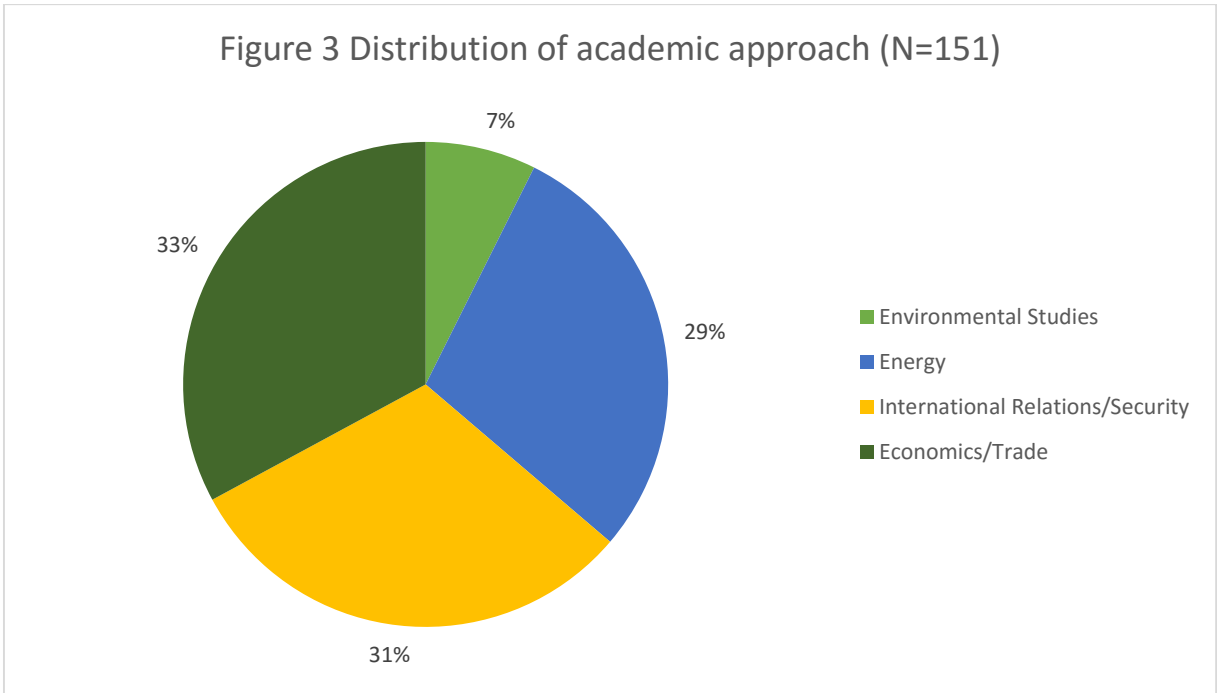
The articles were surveyed for three variables; original publishing year, academic approach and oil-centrism. The academic approach, the stratification variable for stage 2, has four values; environmental studies, energy, economics/trade and international relations/security. There is also a discard value (5) given to articles who did not fit the operationalization criteria for the universe but still showed up in the search. A total of 16 articles were given the discard value, and is not included in the study henceforth. This makes the new N-value for the universe 151.

Figure 2 shows the number of published articles broken down by year. As can be read from the graph, the publication of articles on energy security peaks in the first few years of the 5-year plan period, before a steady decrease in 2013 and 2014. The publication numbers then flatten in 2015.



In my discussion, I present some possible explanation for the early peak, and, maybe more significant, the following steep drop in publication numbers.

Figure 3 breaks down the total publications for the whole period by the academic approach of the articles. As can be seen, there is a relatively even distribution between the fields of energy, international relations/security and economics/trade. The more significant finding may be the significantly lower share of articles written with an environmental studies approach. However, this number does not reflect the degree to which the other articles make “environmental considerations” in their arguments.



This distribution also serves as the basis for the stratified sampling in stage two of the study.

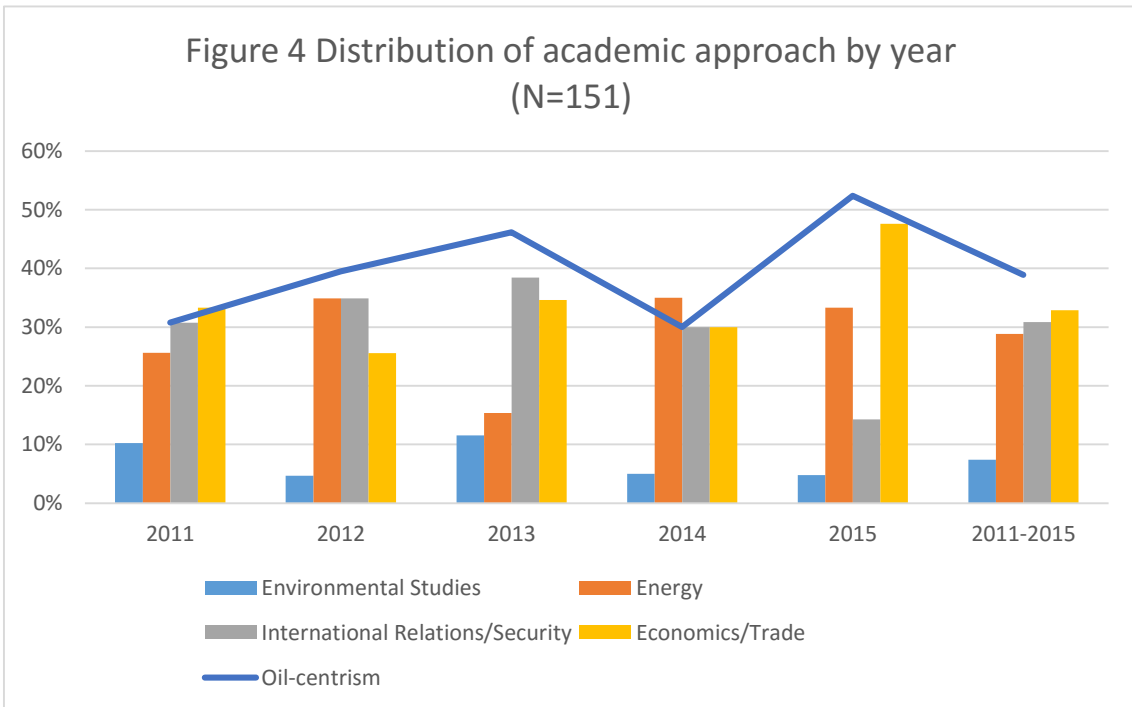


Figure 4 shows the distribution of academic approach broken down by year. It is also the first figure to introduce the “oil-centrism” variable. As can be read from the diagrams, 2013 and 2015 are the only two years to make a significant deviation from the mean, with international relations/security and economics/trade over-performing in the two years

respectively. These two deviations are subject to further scrutiny during stage two of the study.

The oil-centrism graph in *figure 4* portrays the percentage of oil-centric articles broken down by year. This graph peaks in 2013 and 2015 when the number of either international relations/security or economics/trade is uncharacteristically high relative to the two other variables.

The most significant finding presented in the year-to-year comparison of each academic approach is the significant dip in contributions from the energy field in 2013.

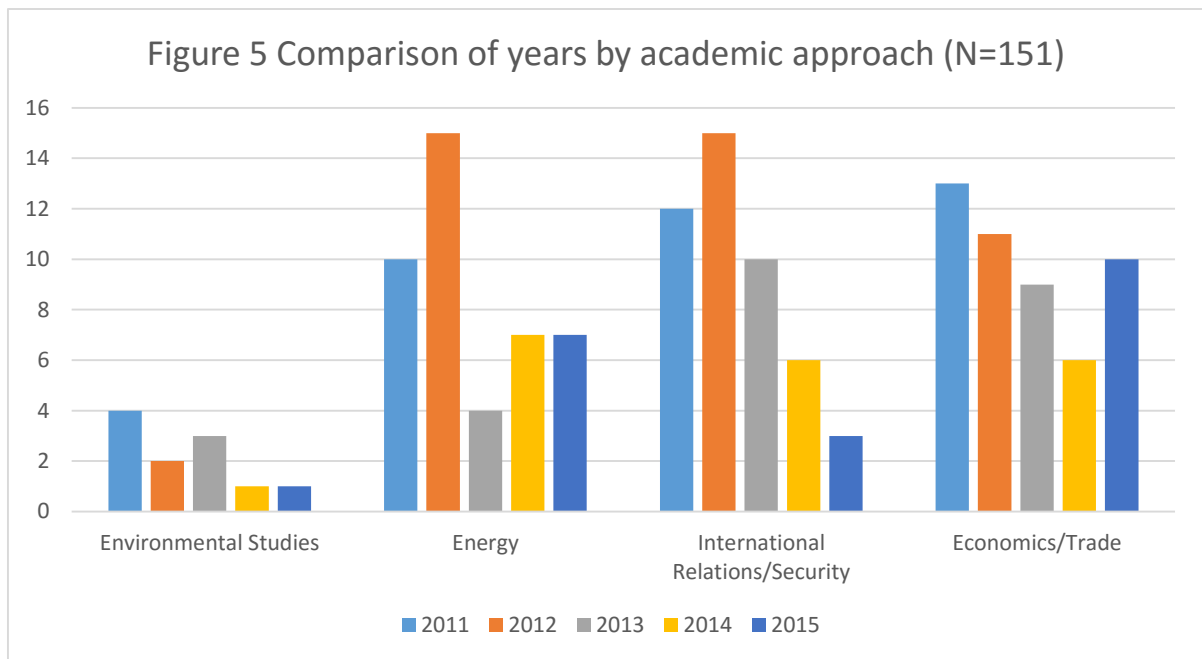
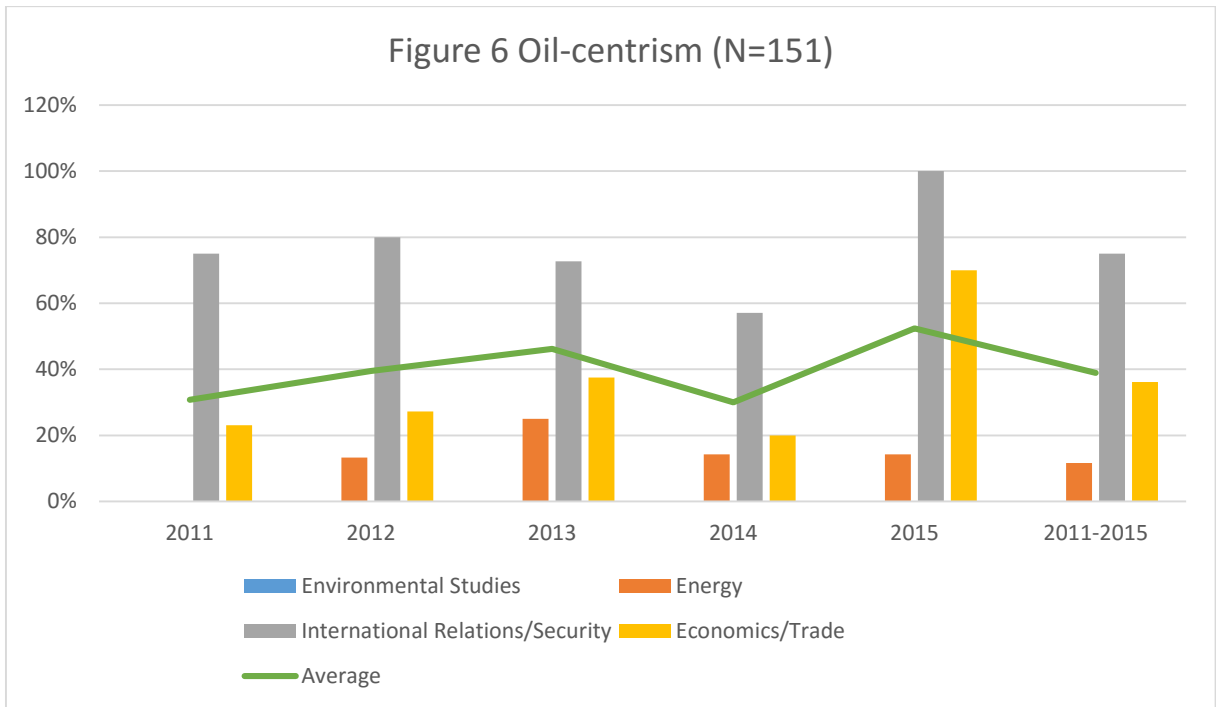


Figure 6 breaks down oil-centrism by both year and academic approach. Some observations can be made immediately. For one, the significant oil-centrism of traditional Chinese energy security described by Erica Downs a decade ago is not reflected in contemporary Chinese literature on energy security (Downs 2004). On average, over the five-year period, only 39 % of the published articles can be considered oil-centric by my definition of the term. Secondly, international relations/security is the only approach to be primarily oil centric. This is also reflected in the year-by-year breakdown, with one exception. This exception is economics/trade in 2015. 2015 was also the year when this approach had the highest share of published articles relative to the other approaches. Thirdly, this finding correlates well with the peak in overall oil-centrism in 2013 and 2015.



3.2. Stage 2

A random sample was taken from the universe, stratified by academic approach. Subsequently, 11 of the articles were discarded and redrawn from stratified pool of oil-centric units, in order for the sample to be representative by both variables. Due to the makeup of each stratum, it was not possible to ensure that all publishing years were represented without sacrificing the random sampling. Thus 2014 is not represented in the sample. The full final sample can be found in the appendix.

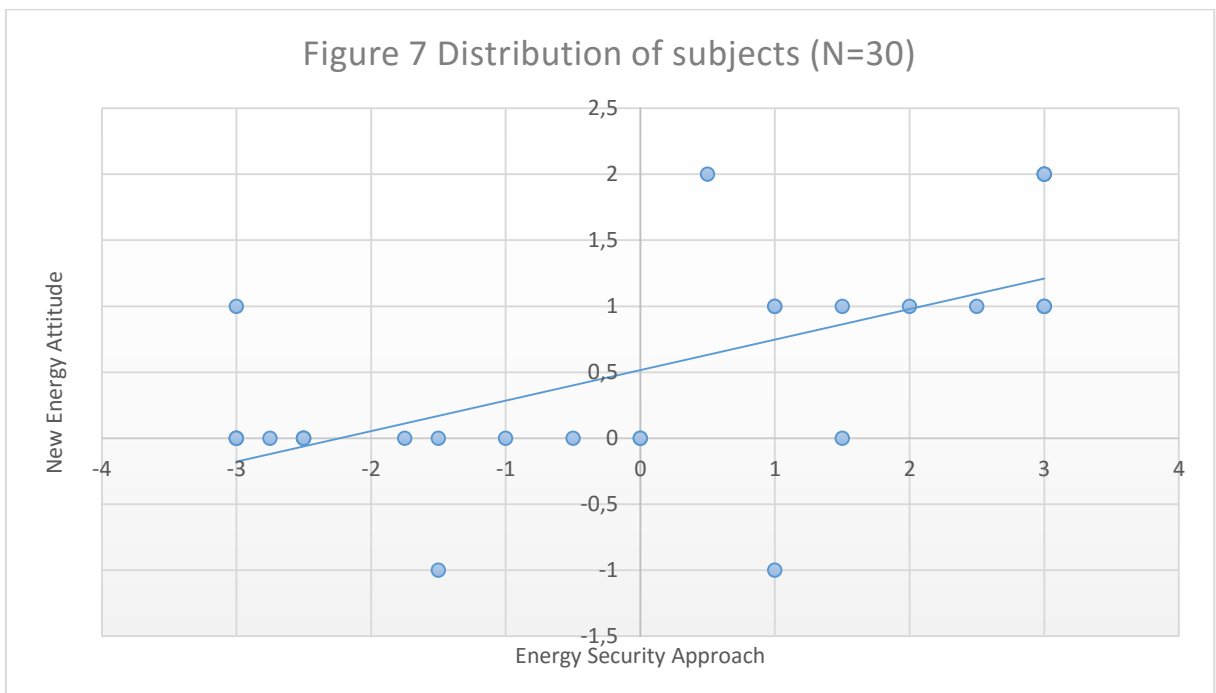


Figure 7 displays the distribution of all subjects, along with a trend line. The values along the X-axis refers to the Energy Security Approach coefficient (ESTOT); the sum of the value of the three variables outlined in *chapter 3*, who determine energy security approach. The values along the Y-axis shows the attitude towards new energy in an energy security context, the (NE).

The NE-variable ranges from -2, green energy development is detrimental to energy security, to +2, ensuring energy security hinges on green energy development. The value of 0, however, is not entirely neutral in the context of this study. Contributions that make no mention of green energy development are given a value of 0, though in the context of this study, where a positive result means seeing green energy development as contributing to energy security, not considering it at all is actually a negative result.

The graph shows a correlation between energy security approach and new energy attitude, although perhaps not as strong as expected. There is a good grouping along the trend line. It is worth noting that the trend line does not cross through the axis origin, but rather crosses the Y-axis at 0.5. This suggests that the Chinese energy security literature in general is positive in its attitude towards green energy development.

Table 1 New Energy Attitude by Energy Security Approach	
Energy Security Approach	New Energy Attitude
$ESTOT > 0$	1,07
$ESTOT \leq 0$	0

Table 1 underlines the correlation between energy security approach and new energy attitude. It shows that contributions with a more comprehensive understanding of energy security – an ESTOT value of more than 0 – scores an average of 1,07 on the NE-variable, whereas all other contributions averages at 0.

The figures of *table 1* do not, however, prove this correlation, as an NE-value of 0 is not neutral. Seeing as contributions that do not mention green energy development at all are given an NE-value of 0, and not considering alternative energy sources or energy conservation would contribute to a lower ESTOT-value, contributions with a low ESTOT-value are inherently more likely to get an NE-value of 0. *Figure 8*, on the other hand, shows that as the ESTOT-value increases, so do the average NE-value.

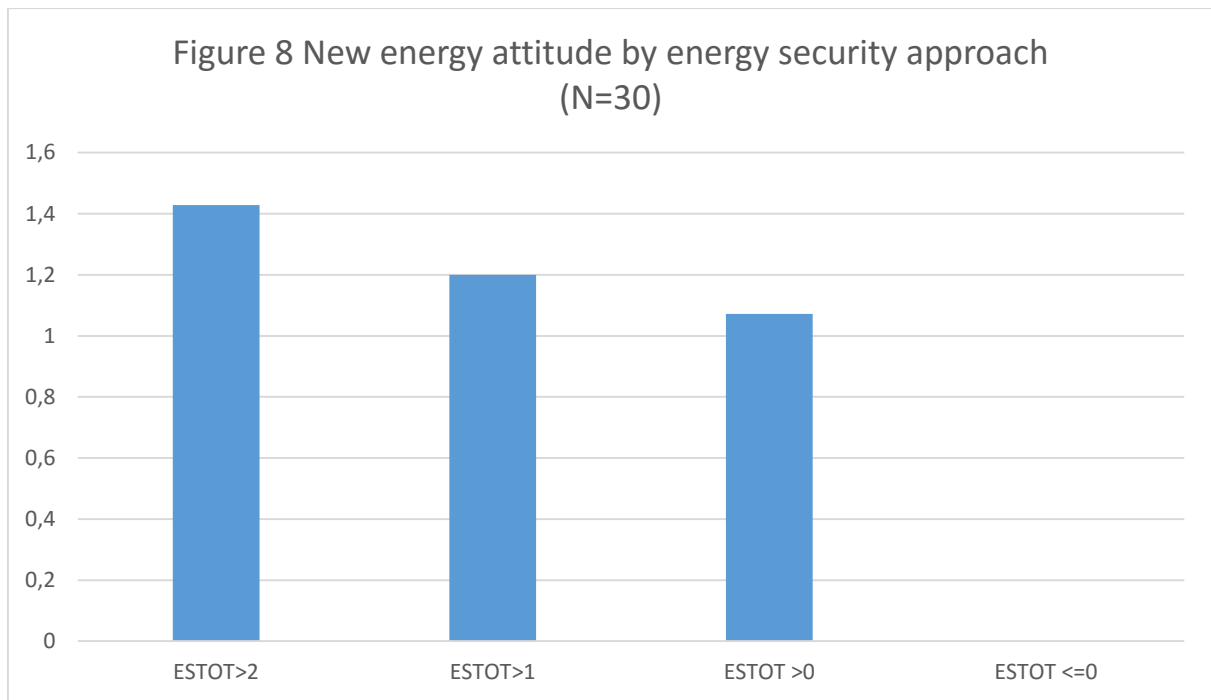
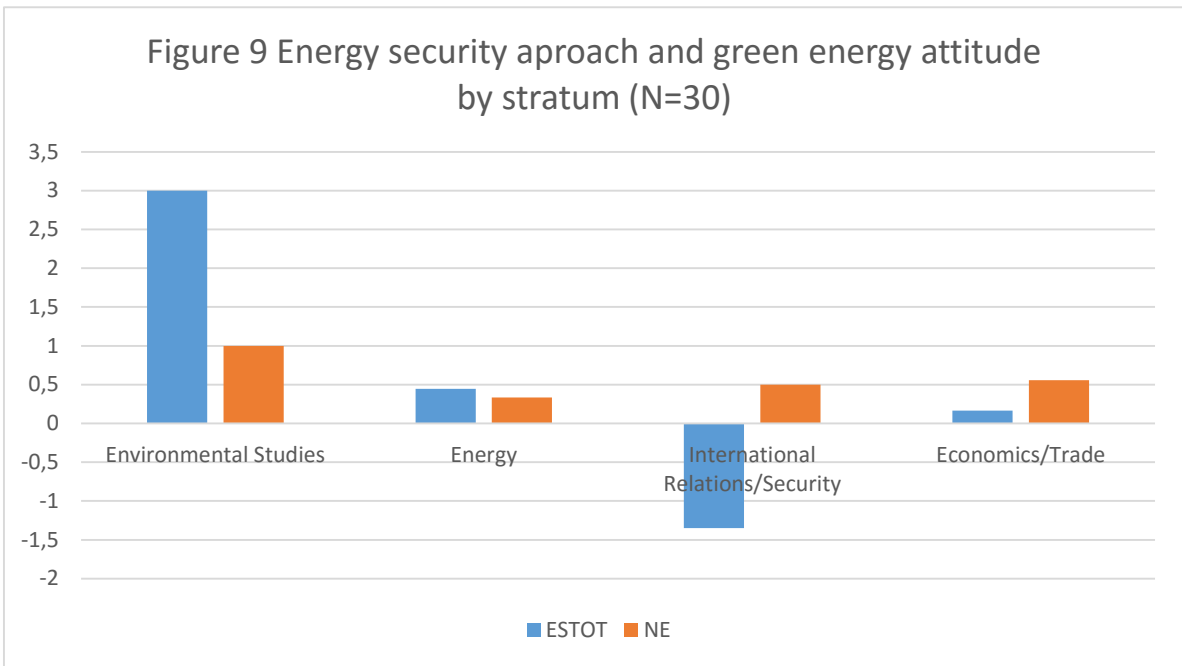


Table 2 shows that the correlation works both ways, as an increased NE-value results in a higher average ESTOT. As NE-value increases, so does average ESTOT-value.

Table 2 Energy Security Approach by New Energy Attitude	
New Energy Attitude	Energy Security Approach
NE >1	2,38
NE >0	1,81
NE =0	-1,67
NE <=0	-1,50

Figure 9 shows that while all academic approaches average a positive attitude to green energy developments effect on energy security, only stratum 3 (international relations/security) averages a more restricted understanding of energy security.



From *figure 9* it may seem that contributions from the energy studies have the least positive attitude towards the effect of green energy development on energy security. While it is true that they have the lowest average NE-value, *figure 10* shows that this is only part of the truth.

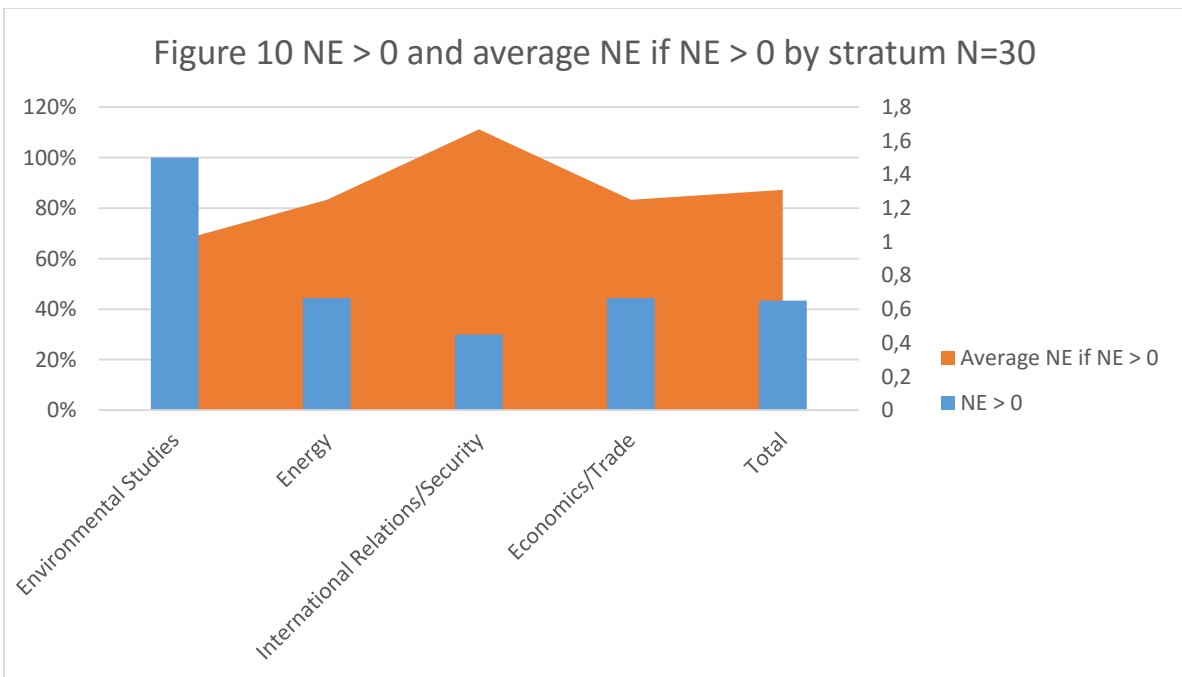


Figure 10 displays two sets of data. The first is the share of literary contributions with a positive attitude towards the effect of green energy development on energy security. The second is the average NE-value of those contributions. From these data, we can read that just over 40 % of the sampled literature had an NE value greater than 0. Furthermore, contributions with an international relations/security approach had the lowest share of contributions with a positive NE-value. However, of those contributions with a positive NE-value, contributions within this stratum had a markedly higher average NE-value. From this we can conclude that whereas scholars with an international relations- or security background are less likely to consider green energy development as positively affecting a country's energy security, those who are is likely to be more positive than the average.

4. Stage 3 – Discussion

In the following chapter and subchapters, I try to answer my research questions using the results of the survey of Chinese energy security literature. The arguments are being exemplified using a selection of the sampled literature.

One observation about Chinese energy security literature that becomes visible early on is the apparent lack of expressed theoretical considerations in much of the non-theoretical literature. Unlike in western literature, where it would fall naturally to verbalize some sort of understanding of the concepts; a large portion of the Chinese literature makes little or no mention of what the author understands as energy security. A second observation is that for someone coming from a western academic tradition, the Chinese academics directly engage other academics or publications in their discussion to a much lower degree than one is used to. One may get the early impression that the Chinese academic debate is more a set of monologues than a dialogue.

Despite the lack of an expressed theoretical understanding of energy security in parts of the reviewed literature, it must still be possible to discuss the theoretical approaches of the author. Any practical discussion of energy security must by nature also possess some theoretical understanding of the concepts. I have chosen to label this an implied theoretical understanding of energy security. I find that, using my framework for classifying the theoretical approach, the articles with an implied theoretical framework are just as possible to study from a theoretical point of view as the ones with an expressed

theoretical framework, and their theoretical understanding is just as valid as those who reference foreign or domestic theorists.

Here are two examples from the survey.

“A large number of organizations and scholars (Yergin, 1988; IEA, 2001; Han Wenke, 2010; Winzer 2011) have studied and defined energy security. In summation, 'energy security' is a country's continual ability to obtain sufficient, affordable and clean supply of energy to satisfy its energy needs, thereby ensuring sustainable development of economy and society.”¹ (Xiao, 2013, p. 52)

In this example, the understanding of energy security is clearly stated, with references to both foreign and domestic contributors.

The other example, Tao (2011), does not provide a theoretical definition of the concept of energy security. Instead, the author launches straight into a list of practical tools and considerations connected to energy security. By doing so, Tao implies what makes up his concept of energy security, without expressly stating a conceptual framework (Tao, 2011, p. 35)

By equating expressed and implied theoretical framework, it is possible to study the theoretical approaches of literature which doesn't approach a subject theoretically.

4.1. Do the Chinese academic community subscribe to a more restricted or more comprehensive understanding of energy security?

So what does the collected data tell us about Chinese academia's general approach to energy security?

Overall, the average ESTOT value of all surveyed articles is -0,07, or more or less neutral. However, as can be seen from the distribution diagram in *figure 7*, the Chinese academic contributions are spread along the entire spectrum, from restricted to comprehensive. In total, there is an equal distribution of contributions with an ESTOT value greater than 0 and an ESTOT value lower than 0. Rather than saying that the theoretical approaches to

¹ Authors translation. Original text: 大量机构和学者(Yergins, 1988; IEA, 2001; 韩文科, 2010; Winzer, 2011)对能源安全问题进行了深入研究,分别给出了能源安全的定义。综合来看,“能源安全”就是一个国家持续地获取足量、经济、清洁的能源供给以满足合理的能源需求,从而保障经济社会平稳运行和可持续发展的能力或状态。

energy security in Chinese literature is neutral, it would be more precise to say that it is varied. This concurs with one of my hypotheses, being that the Chinese academic energy security debate is more varied than one might expect from an academic community working under an authoritarian rule..

More interesting than both the average value and the distribution, however, is the change in average ESTOT value between the different academic backgrounds of the contributors. As shown in *figure 9*, contributions from the environmental studies – by far the smallest group – adheres to an overwhelmingly comprehensive understanding of energy security, whereas contributions from the international relations- and security communities subscribes to a much more restricted approach. The energy- and economics/trade contributions are both closer to a neutral ESTOT-value.

Another point to factor inn is that the ESTOT variable is the sum of the three variables outlined in my framework:

- 1) What to protect?
- 2) From what risk?
- 3) By what means?

This means that a contribution with an ESTOT value close to 0 could very well have a very restricted definition of one part of its energy security concept, and a very comprehensive understanding of another part. As a matter of fact, the average values of each of the three variables are 0, -0.2 and 0.1, respectively. Although not overwhelming differences, it shows that they have a slightly more restricted understanding of what threatens energy security, and that a 57 % majority have value lower than 0 on the energy security risk variable.

Zhang (2012) exemplifies this phenomenon. Zhang understands what to protect as control over energy production; the risk to protect this production from as the competition of fossil fuels in the global resource marketplace; and proposes source diversification and green energy development as the means to combat this risk. Yan (2015) on the other hand, while sharing an understanding of the threat to energy security similar to Zhang's, proposes a very different solution, namely to slow the move from coals to natural gas in order to become less restricted by the global resource market.

Examples like this tells us that it would be presumptive to claim that the understanding of China's energy challenges will necessarily decide the proposed energy security measures.

If one accepts the arguments of Downs and Shambaugh, about how policy within the fields of energy (Downs 2004) and security and international relations (Shambaugh 2013), the two from which energy security has traditionally been made up, do not reflect the aggregate of opinions but rather the strongest voices within the fields, then the approaches within each of these four fields of study will be more significant than the aggregate. It all comes down to whose voices are the strongest, and where the links between academia and government are the strongest.

For any of this to bear significance to the future of energy development in China, it must be proven that the energy security approach correlates with the attitude towards green energy development in an energy security context.

The results of the literature survey give strong indications of such a correlation. As mentioned in *chapter 3*, the trend line in figure shows that the contributions with a more comprehensive understanding of energy security have a more positive attitude towards the impact of green energy development on energy security. However, the distribution of the dots in this figure also show that contributions with a ESTOT value below zero overwhelmingly do not consider green energy development at all when discussing energy security. It would therefore be presumptive to claim that contributions with a more restrictive energy security definition sees green energy development as hurting overall energy security.

Figure 8 and *tables 1* and *2* confirms the correlation between energy security approach and attitude towards green energy development as an energy security measure, as the average NE-value increases with the ESTOT-value.

These findings go a long way in confirming two of my hypothesis. There do seem to be a correlation between the scholarly understanding of the concept of energy security and said scholar's attitude towards green energy development. Based on this survey, indications are that scholars with a more comprehensive definition of energy security will be more likely to consider green energy development as promoting energy security.

4.2. How does Chinese energy security literature approach the topic of green energy development and environmental protection?

What is the current standing of green energy development in energy security literature in China? To answer this, I will first present, and comment on, some of the key findings of the quantitative survey of the Chinese literature.

First, the positives. As the aforementioned trend line in figure seven crosses the Y-axis at 0.5 rather than crossing through the axis origin, I would argue that the field as a whole consider green energy development to be contributing to energy security, albeit not as a major influence. Furthermore, of the thirty surveyed articles, only two expressly states that green energy development hurts the overall security of a national energy system. *Figure 9* shows that contributions from all academic approaches have an average NE-value greater than 0.

On the negative side, a very large portion of the surveyed literature does not take green energy development into consideration at all. In fact, only 43 % of all surveyed literature have a NE-value greater than 0. The fact that less than half of the surveyed literature include green energy development in their considerations shows that the green energy sector still has some way to go to become a major player of China's energy security debate.

As presented in *figure 10*, a further breakdown of the data shows that green energy development has the strongest presence in the literature from the environmental studies. Of these contributions, all had a NE-value greater than 0. However, as *figure 3* shows, these contributions only make up 7 % of all published literature. The weakest presence in literature coming from the international relations- and security communities. However, of those contributions with a positive attitude towards the effects of green energy development, contributions from the international relations- and security communities have a significantly higher average NE-value. This indicates that within the international relations- and security communities, there is a small but very determined group of scholars who are strong proponents of green energy development as part of energy security strategy. This claim is backed by the fact that two of the surveyed articles from this field were given the highest possible NE-value, 2, which means that they consider the energy security to *hinge on* the future development of green energy. These two contributions share several traits. They both have a value of 3 on the ESTOT-variable, meaning that they subscribe to a very comprehensive understanding of energy security,

and they both cite environmental and social cost of energy acquisition as the most important threats to energy security. (Jianxin Zhang 2013; Ping 2013)

These social and environmental costs of the generation of energy and acquisition of natural resources are one of three running themes in the literature with a positive attitude towards the effect of green energy development on energy security. The core argument is that the social and environmental cost of energy are lower for greener energy sources. Of the literature with a NE-value greater than 0, more than half expressly states the social and/or environmental cost of energy generation as a threat to energy security. As mentioned in the theoretical background of this study, making social and environmental considerations when calculation the cost of energy is traditionally part of the more comprehensive energy security frameworks, and thus fit well with the other findings of this study.

Another common argument of the green energy positivists is related to the insufficient access to existing energy resources. This argument addresses the supply side of the energy balance. The argument is that China's access to energy resources is a) insufficient (Qin 2013), b) too expensive (Q. Zhang 2011) or c) too reliant on imports (J. Yu and Wang 2013). This argument is the one that fits the best with the more restricted understanding of energy security, as it addresses only the supply side of the energy balance. However, the proposed solutions are more on par with a more comprehensive framework, as they involve developing alternative energy sources rather than increasing control over the existing ones.

The third common theme is the inefficiency of the utilization of the already acquired energy sources, or simply just energy efficiency. This can be seen as the counterpoint to the insufficient access to energy resources. Where the latter addresses the supply side of the energy balance, this argument addresses the consumption side of the equation. By addressing the consumption side of the energy balance, these contributions are inherently more comprehensive in their approaches to energy security (J. Yu and Wang 2013).

On the opposite end of the spectrum are those few contributions who see a focus on green energy development as hurting energy security. As mentioned previously, there are only two of them among all the surveyed literature. Although they make up a very small minority, it still makes sense to present their arguments. They both see maintaining a positive energy balance as the goal of energy security, whereas they differ in their opinion

of what threatens the energy security. Yan (2015) emphasizes the global competition for energy resources as the primary threat, while (K. Zhang 2012) high economic costs of energy generation as the biggest threat to China's energy security. Their solutions both run contrary to green energy development, as Yan advocates slowing down the shift away from coal, as this shift will make China more reliant on imported energy sources; and Zhang advocates using cheaper energy sources, in place of the cleaner, more expensive sources. On the topic of alternatives, Zhang states the following:

*“The combined notions of China's energy makeup not being satisfying and worries about the environment have become a strong ideological trend, urging a swift change of this situation. Increasing the share of low carbon non-fossil energy has in particular been achieved through investing in new energy sources like wind- and solar energy. However, after a decade of large investments, the effects have been less than ideal.”*² (K. Zhang 2012, p. 19)

Although this is primarily a study of the presence of green energy development in Chinese energy security literature, the focus areas of the portion of the literature that doesn't touch the subject of green energy development still bears mentioning. For one, it makes up the majority of the energy security literature. Secondly, a brief rundown of the major focus areas may help explain why they don't approach the topic of green energy development.

A second part of the explanation can be found in what these contributions define as the goal of energy security. An overwhelming majority defines this as control over natural resources, primarily fossil. The final indication can be found in what are the perceived threats to energy security according to these contributions. They are largely connected to oil-prices (Tan 2012; Wang 2012; Hua 2015; H. Yu 2015), competing for natural resources (Xiao 2013; Yang 2012; L. Wu 2013; D. Wu and Li 2012) and transportation restrictions (Jing Zhang 2015; Tan 2012; L. Wu 2013; D. Wu and Li 2012).

As neither these goals or potential threats to energy security can be addressed through green energy development, it only makes sense that these contributions do not make mention of it. This serves as further proof that the presence of green energy security in

² Author's translation. Original text: 能源构成不满意和对环境质量的担忧汇成一股强大的思潮, 迫切要求迅速改变这种局面。大力增加低碳非化石能源, 特别是以风能太阳能为代表的新能源似乎成为首选途径。但十余年投入大量资金后效果却很不理想。

Chinese energy security literature relies on the working framework of energy security of the academic community.

In terms of my hypothesis, that overall, Chinese scholars have a positive attitude towards the effects of green energy development on energy security, I feel that I can only call this partially confirmed. While the claim is valid by certain metrics, these metrics only paint parts of the picture. While the size of the green energy positivist group is far greater than that of those who see green energy development as a threat to energy security; the fact remains that a slight majority of the academic community do not consider green energy development as a significant part of the energy security question. The first part of the explanation can be found in *table 2 of chapter 3.2*. This shows that contributions with an NE-value of 0 have a very low average ESTOT. They are thus inherently less likely to consider green energy development as part of an energy security framework.

4.3. What decides the focus of energy security literature in China?

From the two previous sub-chapters, I have concluded that a) there is a significant presence of green energy development in Chinese energy security literature and b) the size and strength of this presence seems to be connected to the theoretical approach to energy security and to the focus of the energy security literature. In order to make any kind of prediction for the future of green energy development in the academic energy security debate in China, it is necessary to discuss what decides the focus and the theoretical approach to energy security.

4.3.1. What makes energy strategic?

In order to answer what influences the focus and theoretical approach of energy security literature, one must ask what makes energy a strategic resource. Then changes in what makes energy a strategic resource, or in the balance between the different aspects of the securitization of energy, can explain how the focus of energy security literature changes.

Gunnar Fermann defines strategic resources as “...resources without which it is almost impossible to conceive socio-economic development within a particular historical era.” (Fermann 2014, p. 23) This definition highlights two important traits of strategic resources. For one, it implies that the status of a strategic resource may change over time. Secondly, that the ultimate goal is to conceive ‘socio-economic development’. I would argue that ‘socio-economic development’ is something that is both subjective in nature and ideologically founded. What one regime, politician or academic considers positive

socio-economic development may differ from the opinion of a different regime, politician or academic. As an example, where one regime may define positive social development as the development of a more open, equal and democratic society, another regime may value increased stability, population control and reduced social unrest. In terms of economic development, it could be a question of high growth versus economic stability. In short, what makes energy a strategic resource in each separate case hinges on the policy goals of the person or persons making the energy security considerations, be it politicians or academics, and both these goals and the prerequisites for achieving them may change over time.

A second important aspect of the securitization of energy as a resource is its finite nature. Scarcity creates competition, but there is a question of how to react to said scarcity. This question will also affect one's approach to energy security as a concept. In rough terms, there are three ways to approach it. One is to seek to increase one's share of the total amount of the available energy resources. The second is to seek to increase the total amount of energy resources available. The third approach is to seek to decrease one's reliance on said resource. These approaches are all represented in the surveyed literature, and I call these the zero-sum approach (Wu 2013), the win-win approach (Song 2012) and the green energy approach (Zhang 2012).

In short, then changes in the perception of the factors that causes the securitization of energy as a resource will cause changes in how the topic is approached academically, as well as changes in what areas of energy security is focused on in the literature.

A third factor which makes energy a strategic resource, and thus strongly influence energy security approaches and focus areas, this one with a very strong historic precedence, is the global geopolitical landscape. As presented in the theoretical background for this study, the energy security approaches of the end of the last century were heavily centered around the power position of Middle-Eastern oil producing countries, as the Middle East as both former and potentially future conflict zone, and reacted directly to this geopolitical situation. While still a geopolitical hot potato, the situation in the Middle East is not as dominating as it once was, especially from China's position. As a result, while present, the Middle East does not dominate today's Chinese energy security literature. What is dominant are the other geopolitical issues and trends. One such issue is, of course, the situations concerning the South China Sea and the Strait of Taiwan. (Jing Zhang 2015;

Tan 2012) Inevitably connected to energy security, due to the presence of offshore natural resources and control over shipping lanes, these issues in many ways play the same role in terms of affecting the energy security approaches today, as the Middle East did in the Western energy security literature of the 80s and 90s, with many of the same challenges connected to security of supply and transportation. (Egberink and Putten 2010; Bradshaw 2009)

The third Factor that influences the securitization of energy is the development of new technology. The most obvious reason for why green energy development was not strongly considered in the western literature of the last century, is that alternative energy sources were not viable alternatives in the same way as they are today, in essence limiting the relevant green energy development to energy conservation measures. With the development of new technology, influencing both the supply and consumption sides of the energy balance, creates new options in the energy sector, which will in turn influence the global deficit of energy resources.

4.3.2. Government – academia dynamics

The dynamic relationship between government and academia is somewhat like the fantastic beast Hydra, and perhaps more so in China than anywhere else. For every question answered, two more appear. It is very difficult to have a concise discussion of how the two influence each other, but I will try to nonetheless.

In essence, the analytic value of this entire study hinges on the belief that the collective opinion of the academic community has some influence on the governing bodies. In this case, it would imply that the theoretical energy security understanding of Chinese academia will have some degree of influence on Chinese energy security strategies. That is, that if a sufficient part of Chinese academic research on energy security concludes that green energy development will strengthen China's energy security, this will be reflected in Chinese energy policy. While there will not be presented any kind of proof, one way or the other it should be possible to construct an argument for why there is some influence of the academia on government policy.

I would argue that the first piece of evidence can be found in the structure of Chinese academic papers. To a much higher degree than I have personally experienced from western academic literature do Chinese academic articles finish with a set of concrete policy suggestions to the government. This would indicate that, at least in the eyes of

Chinese academic, these suggestions may be taken into consideration by the people drafting policy. Secondly, there is the increasing presence of academics in the decision making process in China, which is outlined in the introduction of this study. With the academics being given more prominent positions within Chinese policymaking, the academics will be able to directly influence what official policy looks like.

In terms of what decides the focus of the energy security literature in China, the influence the government has over the academic publications is much more interesting. I would like to separate this influence into two categories – direct and indirect. The direct influence is fairly straightforward. All of the publications catalogued in the National Social Science Database are government funded, with most of them being attached to Chinese public universities. It is not a stretch to think that branches of the government have some level of editorial power over the academic journal, as well as a significant say over the funding of research at the publishing institutions.

The indirect influence may be subtler. As shown in *figure 2*, the number of publications peaked during the first years of the last five-year plan period. This plan had a strong energy-focus, which could explain this peak. In that case, this would be an indication of the indirect influence of the government on academic work. Through these plans, the government sets the current public, official and academic agenda, and it is fair to assume that this agenda influences the focus of the academic work being done. Further evidence of this can be found in the fact that a large number of articles expressly mentions some aspect of the five-year plan when presenting their arguments, and are in some cases discussed in the context of the five-year plan. On the other hand, this indirect may not really be all that subtle – or indirect, for that matter. It comes down to how one sees the position of academia in a socialist country, particularly considering the actual autonomy of government run academic institutions. At the very least, it can be argued that the themes of five-year plans are clear instructions to the academic community of what they should be focusing their work on.

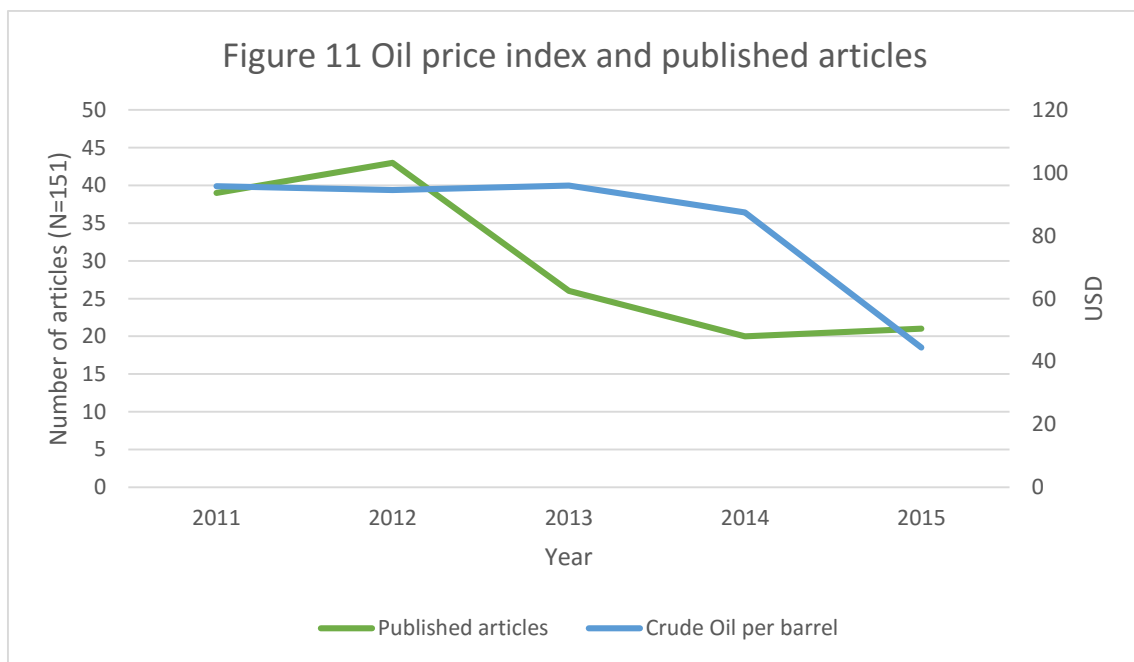
4.3.3. The effect of the oil price fluctuations on energy security literature

The government-academic dynamics is a domestic factor influencing energy security literature in China, and in the next sub-chapter I will discuss what I find to be the most important domestic dynamics in Chinese energy security, based on the reviewed literature.

Before that, I will discuss one of the global factors influencing the focus of the Chinese energy security literature, namely the price of crude oil on the global market.

As previously discussed, the number of articles on energy security published yearly saw a steep decline after the first few years of the last five-year plan period. The number of published articles in 2014 was less than half that of 2012. In the previous sub-chapter, I argued that this early peak could be attributed to a boost provided by the strong energy focus of the then newly published five-year plan. However, there are also some interesting international developments over the same period that may have contributed to the decline.

Figure 11 displays the same graph showing the number published articles by year as in *figure 2*, but also a graph showing the development in the price of crude oil on the world market. While the two graphs do not follow each other perfectly, they follow a similar overall trajectory, especially if you factor in an assumed boost given to the publishing of literature early on, due to the energy focus of the five-year plan.



The intuitive reaction to the presentation of this data would be to think that as the oil price sinks, the acquisition of foreign oil places a lighter pressure on the energy system; therefore, the volume of literature on petroleum-security sinks. This should then free up both fiscal and academic capital to address other energy challenges, such as green energy development and mitigating pollution from energy generation. However, as displayed in *figure 6*, oil-centrism in the published literature actually peaks in 2015.

The notion that the oil-centrism of the energy security literature increases when the price of oil decreases is further supported by looking at the sampled literature in the two years of 2015 and 2013. In 2015, 5 of 11 sampled articles presents domestic energy replacement – the replacement of oil and natural gas with alternatives, and another two promotes increasing domestic production of petroleum. The average ESTOT-value of these articles is 0.4. In 2013, none of the sampled articles promote energy replacement, and they have an average ESTOT-value of -2.

I believe the explanation of the drop in publication can be found in Fermann's definition of energy as a strategic resource. When the price of crude oil sinks, this is an effect of a reduced scarcity. When scarcity is reduced, so is the need for mitigation of scarcity, hence the drop in publication numbers. (Fermann, 2014, p. 29). As scarcity of a resource is reduced, so is the need to replace this resource. Therefore, low prices on fossil fuels may actually hurt green energy development in China in the long run, as the emphasis on green energy development as an energy security measure becomes less prudent.

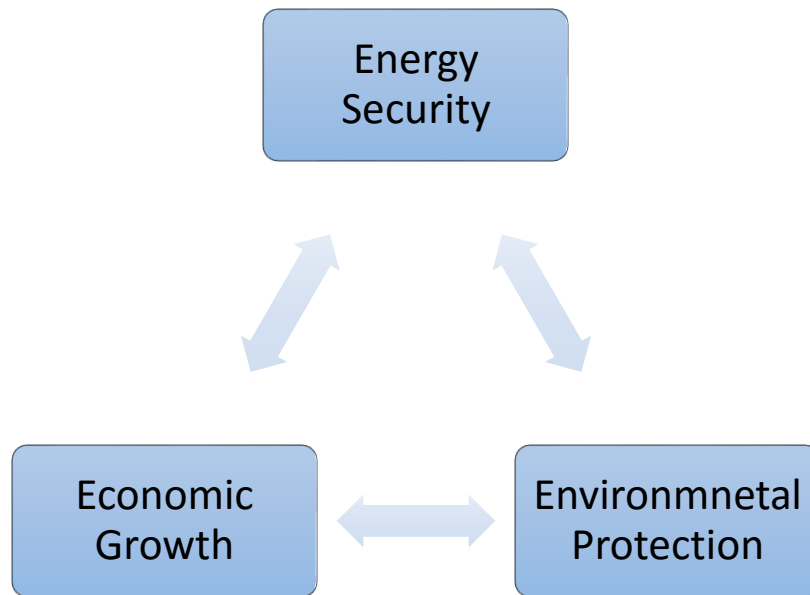
It must be noted that this relates to the effects of fluctuations in the price of crude oil on green energy development as part of the energy security literature. It is not said that oil-price fluctuations have the same effect on the demand for renewable energy in general. In a Forbes article, Victor A. Rojas and Paul Stinson argue the opposite, as oil and renewables are no longer substitutes, and the demand for the two are not directly linked to each other (Rojas and Stinson 2015).

4.3.4. Energy security vs. economic growth vs. environmental protection

Perhaps the strongest trend of the surveyed literature is connected to the ultimate goal of energy security. The vast majority of the literature connects energy security to China's economic growth, with many stating ensuring economic growth as the ultimate goal of energy security. This is a far cry from the emphasis on military security in the literature of the end of the last century.

Figure 12 illustrates the relationship between economic growth, energy security and green energy development. Economic growth has an inherently negative effect on energy security, as economic growth must lead to an increased consumption of energy. As for how green energy development affects energy security, the survey showed that there is a general consensus among most of the contributors that green energy development contributes to energy security.

Figure 12 The mutual relationship of energy security, economic growth and environmental protection



Zhao et al. (2011) have studied the correlation between economic growth and energy consumption by analyzing empirical quantitative data. They find a unidirectional positive effect of economic growth on energy consumption. They also find that green energy development may mitigate this effect.

“China's energy consumption and economic growth have both been trending along the same growth line, though through energy conservation and low-carbon economy development, during the last part of the 11th five-year plan period, economic growth has surpassed the growth in energy consumption,[...]”³ (Zhao et al. 2011, p. 22)

If green energy development does in actuality mitigate the effect of economic growth on energy security, then green energy development will be crucial in maintaining both energy security and economic growth. In that case, there is reason to believe that green energy development will be given some significant emphasis in future energy security work where the expressed goal is maintaining economic growth.

If green energy development is given a larger emphasis in energy security theory literature and practice, and we know from the survey that those academics who make green energy

³ Authors translation. Original text: 中国能源消费总量与经济增长总量均呈指数增长的趋势,但随着节能减排和低碳经济发展的深入,在“十一五”末期,经济增长总量超过了能源消费总量,[...]

development considerations in the energy security question consider it to improve energy security; it then stands to reason that a focus on economic growth in energy security literature and practice will lead to more green energy development.

Concerning the increased consumption of non-renewables connected to economic growth Yu and Wang (2013) claim that their “[...]study shows that through domestic energy replacement, China may decrease its dependence on foreign energy, thereby protecting energy security from influencing economic growth.”⁴ (Yu and Wang 2013, p. 35) In other words, not only do green energy development mitigate the negative effect of economic growth on energy security, it also reduces the negative effect of energy security considerations on economic growth. According to the arguments presented in the surveyed literature about the relationship between economic growth, energy security and green energy development, green energy development strengthens energy security and economic growth at the same time by mitigating the negative effects they have on each other.

The understanding of the directionality of the causal effects in *figure 12* will in any case determine the focus of energy security literature in China. According to the Chinese literature on energy security, there is reason to believe that economic growth can have a positive indirect effect on energy security if the economic growth leads to increased green energy development.

In light of the interconnected nature of energy security, green energy development and economic growth, the key to successfully balancing all three interests is creating good, comprehensive policy. Individual government bodies and interest groups, with individual policy goals, creating individual policies to address their narrowly defined policy-areas will result in the opposite. One very interesting thing to follow in the future is the effect of lowered economic growth targets. As the majority of the literature of the past five years has been written in a political climate seeking to maximize economic growth, it will be interesting to see how lowered economic growth targets will affect the energy security literature (Magnier 2016). If the Chinese government succeeds in achieving a lower, but more stable economic growth rate, this will in all likelihood have ramifications for China’s energy security and green energy development, both in theory and practice.

⁴ Author’s translation. Original text: [...]研究认为可以通过能源内部替代的方式实现中国能源对外依存度的减少，保证国家能源安全的前提下不影响经济的高速增长。

5. Concluding remarks

When beginning this thesis, I set out to structure a comprehensive overview of Chinese academic work on energy security. Chinese energy security as a topic has been, and in all likelihood will continue to be, discussed at length in both in and outside China. Outside of a decade-old account of the political debate over energy security in China, this field was very thinly discussed prior to this thesis. As in any case of breaking new ground, there are bound to be some weaknesses, especially when in essence developing a methodology from scratch with a limited experience. Some may call that hubris, but I choose to see it as a learning experience. I will now discuss some of the challenges I encountered and some of the weaknesses of the study.

The biggest challenge compared to doing a similar review of western literature was the lack of a coherent debate. In a western academic debate, one would be able to locate the more influential contributions by following the citations. In my experience, Western academics address each other to a much larger degree than their Chinese counterparts. Even the more frequently cited works would be lucky to have been cited a double-digit number of times, according to the online databases. This lack of a structured debate was the main rationale behind the choice to use random sampling when selecting what literary contributions to review. The most important tradeoff of doing a random sampling is that, statistically, I am very likely to have missed one or more very influential contributions. However, as the goal of the study was to capture the larger trends and lines of separation in the field, I would make this choice again. This methodology allowed me to get through a very large amount of literature for a one-semester master thesis, and with a sample of almost 20 %, the results should be fairly representative.

The second weakness to discuss is the sampling itself, especially the limited stratification. There are a few points to discuss here. Firstly, the basis for the stratification of the pool of literature was title, publisher, topic-tags provided by the author and the contents of the abstract. This gives a fairly limited impression of the text. However, I would still repeat this method, as the cost in terms of time and work of doing it more thoroughly would not match the potential gains in terms of gained insight. Secondly, it is the evaluation of each piece of reviewed literature. Even with what I consider a solid operationalization of the research questions and conceptual framework, there is a large subjective element in this study. This is largely due to the implied nature of the theoretical understanding of the

energy security concept in much of the literature, making the values on the ESTOT-variables in particular somewhat subjective. I can, however, not see any practical solution to this, other than someone else repeating the study and comparing the results. Lastly, I would strongly reconsider the way I chose to stratify the sample. I maintain that academic approach, or background, is the most relevant distinction to make when discussing a topic with as interdisciplinary a nature as energy security. However, if I were to do it all over again, I would probably have prioritized publishing year over oil-centrism. For one, the different academic approaches differed sufficiently in their level of oil-centrism for this variable to be covered sufficiently by the initial stratification, hurting the generalization. Secondly, the loss of the opportunity to study some of the year-to-year changes was far greater than a similar loss of opportunity to make comparisons based on the oil-centrism variable would have been.

Despite the aforementioned weaknesses, I believe I far and along achieved what I set out to do. The data presented in *chapter 3* does provide a structured overview of the academic debate about energy security in China over the course of the last 5-year plan period, particularly in regards to green energy development. I believe it offers a fine insight and a good starting point for anyone wishing to delve deeper into Chinese energy security literature. In light of the increasing influence of academics on decision-making in China, it also provides the basis for a discussion about the future development of Chinese energy security policy. Thus it fills a hole in the existing academic work on Chinese energy security.

As for addressing my research questions, the study has provided some answers.

Do the Chinese academic community subscribe to a more restricted or more comprehensive understanding of energy security? The study shows that the best description of the theoretical approach to energy security in China is varied. While the average is close to neutral, the surveyed contributions are spread along the entire spectrum. The study thus confirms the hypothesis that the Chinese academic energy security theory debate is more diverse than Chinese energy policies would suggest.

How does Chinese energy security literature approach the topic of green energy development and environmental protection? Among those scholars who make considerations of green energy development when discussing energy security, the general consensus is that green energy development contributes to the overall energy security.

However, far too large a share of the academic community does not make any consideration of green energy security for me to conclude that Chinese scholars have an overall positive attitude towards the effects of green energy development on energy security. While those who see the windmills recognize that they are, in fact, windmill and not giants, many in the academic community do not notice the windmills at all.

The study further proves that there is a correlation between the scholarly understanding of the concept of energy security and said scholar's attitude towards green energy development, and that scholars with a more comprehensive definition of energy security will be more likely to consider green energy development as promoting energy security.

What decides the focus of energy security literature in China? The results of the survey and the discussion provide some indications of how external and internal factors influence the focus of energy security literature. There seem to be a correlation between the price of crude oil and the publication rate and focus of energy security policy, and government actions appear play a role in setting the academic agenda. So do the geopolitical climate. These findings should only be considered as indications, not as proof. For that, the survey is not detailed enough.

A claim that stands up to more scrutiny is that of the influence of economic growth on energy security and green energy development. Chinese energy security literature is overwhelmingly dominated by the goal of maintaining economic growth. As there are proven mutual relationships between economic growth, energy security and green energy development, both in Chinese and western literature, the future development of China's economy will be a deciding factor in both energy security and green energy development.

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Appendix

Stratified pool of literature

Title	Author	Year	Stratum	Oil-centric
浅析中国在中亚地区的能源安全战略	钱娟	2011	3	1
中国能源安全及对策	彭倩, 姚兰, 胡国松	2014	2	0
乌克兰危机对欧洲能源安全的影响	须同凯	2014	5	1
提升我国能源安全的最优路径	张生玲, 郝宇, 荣婷婷	2012	2	1
中国海外能源安全战略探析	颜志强	2012	3	1
2AST 能源安全概念框架及集成评价研究	余敬, 王小琴, 张龙	2014	2	0
如何保障能源安全——以印度炼油业为中心的考察	赵夏乙	2012	2	1
从发展理念和发展方式解读能源安全	郑云杰, 高力力	2014	4	0
试析我国南海能源安全新战略：以海南为战略基地	张晶	2015	3	1
中国能源安全的路径选择与战略框架	沈镭, 薛静静	2011	1	0
基于国家能源安全的海外油气管道战略研究	曹峰, 郗白珂, 孙仁金, 张宝生	2015	4	1
能源安全视角下的印度“东向”外交	李昕	2013	4	0
中国能源安全新思考	陈沫	2012	3	1
中国能源安全分析与展望	赵鲁涛, 程蕾, 薛美美, 李冰冰, 付敏	2014	2	0
能源安全：美国与巴西生物燃料合作评析	徐振伟, 田钊	2012	5	1
2000～2012年中加能源安全指标的测度及双边能源合作前景	林珏	2014	4	0
世纪前半期日本的能源安全与科技发展	冯昭奎	2013	5	1
能源安全与能源保障体系构建策略——以浙江为例	张伟平	2011	2	0
能源安全与中国节能的现实路径	涂正革	2012	2	0
中东的战略地位与中美能源博弈——超多强格局时代中国的能源安全战略	高思雨, 李东云	2011	3	1
加强中国与东盟能源安全合作的国际法思考	谭民	2012	3	1
国际法视角下的中国-东盟能源安全合作	谭民	2012	3	1
我国能源安全面临的挑战及法律对策	谭柏平	2012	2	0
中国-东盟能源安全合作及其国际法律保障	谭民	2012	3	1

日本能源外交与能源安全评析	尹晓亮	2012	5	0
乌兹别克斯坦保障能源安全的特点	什·胡萨伊诺夫 M.西迪乔娃(译)	2011	5	1
中国能源安全面临的战略形势与对策	吴磊	2013	3	0
中欧能源合作的未来——基于能源安全与气候变化的分析	张晓慧	2012	4	0
东亚能源安全合作现状与前景展望	孙万菊	2011	3	1
中国能源安全分析：基于最优消费路径视角	张生玲, 郝宇	2012	2	0
基于能源安全的煤炭清洁化利用国际动向与中国行动	李世祥	2011	2	0
新能源安全观下的中国能源外交	闫世刚, 刘曙光	2014	3	0
能源安全：理性看待与困境突围——确保我国能源安全的五大关键	杨名舟	2012	2	0
全球能源安全智库论坛第三届年会征文启示 2014年6月, 北京·中国社会科学院		2014	5	0
试论新疆在保障我国能源安全中的作用及建议	肖仁俊	2013	2	0
中国能源安全与周边环境	秦宣仁	2013	2	0
中国能源安全的政治化与去政治化	张中祥	2015	3	1
中国与东盟能源安全合作的障碍与前景	黄莉娜	2011	3	1
以国际视野看能源安全	陈新华	2012	3	0
能源安全与经济增长的双赢机制研究	于江波, 王晓芳	2013	4	0
能源安全视角下的物流业低碳化发展对策	郑凯, 汝宜红	2011	4	0
基于开放复杂巨系统理论的能源安全及预警研究	张强	2011	2	0
印度的能源政策与能源安全	方匡	2011	5	1
新常态下中国能源安全观刍议	周涛, 宋明强	2015	1	0
中国能源安全与经济增长的实证分析	赵新刚, 刘璐, 刘平阔, 王宝	2011	4	0
低碳理念下农村能源安全的法律保障	才风敏 徐猛	2011	2	0
科学发展观视域中的中国能源安全新范式	赵庆寺	2013	1	0
加强国际合作, 发展灵活燃料技术, 推动能源革命——“全球能源安全智库论坛 2014 年会”在京召开		2014	3	0
打造完善能源体系 捍卫我国能源安全——访国网能源研究院财会与审计所所长郑厚清	李云帆	2011	4	0
“第二届全球能源安全智库论坛暨 2013 年会”举行	刘强	2013	5	0
北非阿拉伯国家的资源民族主义及其影响	肖洋	2013	3	1
试论中国能源国际战略的改革与调整	赵庆寺	2011	3	1
石油经济学：国际油价波动机制与我国的能源安全	黄一玲	2013	4	1

能源安全约束下中国低碳经济发展之难点与创新问题探讨	高建良, 蔡锦瑜	2011	4	0
保障能源安全需调整优化能源布局	曹新, 张宪昌	2012	2	0
新书推荐:《中国能源安全的国际环境》		2013	5	0
“2012 能源安全与低碳经济国际论坛”综述	刘强	2012	4	0
中国能源安全与节能降耗指标体系差异化原因分析	米强, 张安军, 米娟, 李峰	2011	2	0
能源安全、经济复兴与气候变化关注:奥巴马能源新政及对中国的启示	杨卫东, 郭堃	2012	1	0
我国能源消费现状影响能源安全	张抗	2012	2	0
提高能效是能源安全的重要内涵	杨宏伟	2012	2	0
全球能源格局巨变中的中印能源安全问题	全毅 刘京华	2012	3	1
震后日本能源战略调整及其对我国能源安全的影响	张季风	2012	2	0
从中缅油气管道看中国能源安全战略选择	王晓梅	2013	2	1
以低碳能源安全化解人类本体性存在的风险		2011	1	0
乌克兰危机中的能源博弈及对中国的影响	于宏源, 曹嘉涵	2014	3	1
拉美的资源民族主义与能源安全:对全球原油供给的意义	戴维·R, 马雷斯, 赵欣, 郭存海	2011	3	1
日本的海外能源开发与投资及其启示	徐梅	2015	5	0
超越外部围堵的能源安全战嘴	杨鸿玺	2013	3	0
《权力与规范:东北亚能源安全合作》出版	卷平冈	2011	5	0
能源安全评价研究述评	苏铭, 张有生	2012	4	0
中俄石油合作的现状及存在问题	王菲菲, 孙玉婷	2011	4	1
我国煤炭产业发展面临的新问题及对策	李世祥, 马海燕	2012	2	0
页岩气革命给美国气候政策带来的挑战	元简	2012	3	1
奥巴马政府北极政策评析	丁煌, 赵宁宁	2013	5	0
中国能源安全系统的仿真模拟	郭玲玲, 武春友, 于惊涛	2015	2	0
我国能源进口市场结构及其依赖性研究	董桂才	2015	4	1
中阿经贸的发展与问题	王猛	2012	4	1
中国核电安全监管能力及其现代化	王伟, 孔静怡	2014	2	0
从管制到放松:日本石油政策演变及其成因	朴光姬	2013	5	1
俄罗斯能源政策及相关热点问题评析	陈小沁	2014	5	0
浅析非洲的安全纽带威胁与中非合作	于宏源	2013	1	0
金融危机阴影下的能源状况及中国的应对策略	吴丹妮	2011	4	1

“走出去”战略与中国能源安全”学术研讨会将于 2012 年 11 月 24 日在京举行	苏娟	2012	3	1
上海合作组织能源合作及其对中国的积极影响	张耀	2012	4	0
21 世纪初国际能源格局及今后的中长期变化——兼论日本能源安全的出路和困境	冯昭奎	2013	3	1
核电公众接受性研究展望	陈润羊	2015	2	0
中国能源生产与消费取向：自发达国家行为观察	许勤华	2014	2	0
深化原油价格与税费改革的政策建议	华晓龙	2015	4	1
中国如何应对全球能源格局震荡	于宏源	2015	4	1
影响能源法功能选择的若干动因分析	王利	2011	2	0
美国液化天然气出口前景与中国	曹嘉涵	2013	3	1
我国外部能源利用与区际能源供需平衡分析	吴大鹏, 李天德	2012	3	0
世界生物燃料发展与粮食安全保障的兼容性分析——基于土地的视角	向丽	2011	4	0
国际能源变局下的拉美能源形势及其应对	王双	2014	3	1
中国煤炭消费环节安全度量体系的构建与实证分析	高昊	2012	4	0
日印近期强化战略合作的深层背景与影响	高新涛	2011	3	1
美国生物能源政策的实施及对中国的启示	徐振伟	2014	2	0
能源安全预期、现状偏好与大国的能源外交决策	张晓慧, 肖斌	2011	3	0
南海能源安全问题及其战略选择	张礼祥	2012	3	1
低碳发展的国家驱动力分析及中国的应对策略	章仁俊, 张学洪	2011	1	0
南非媒体舆论对中国对南投资的认知和评价研究	欧亚, 朱鹍	2015	5	0
试析近年来不断深化的日印关系——兼从日印能源合作的视角	庞中鹏	2011	5	1
国际能源金融问题研究进展	李忠民, 夏德水	2014	4	1
市场失灵、机制设计与全球能源治理	徐斌	2013	4	1
能源地缘政治与中国能源战略	董秀成, 皮光林	2015	4	0
新能源产业政策体系研究——以山东省为例	张宪昌	2015	2	0
世界海洋危机	Ю.А.叶尔绍夫 张广翔, 钟建平	2012	3	1
主题讨论：能源安全与中东能源政治——叙利亚危机的根源及未来政治生态	姚大学, 闫伟	2012	3	1
中美能源与气候合作博弈：深化与突破	田慧芳	2013	4	0
西亚北非地区动荡与中国能源案例探析	檀有志	2013	3	1
论新格局下的中国多边国际能源合作	马方方, 刘长敏	2015	3	1
中国与海湾国家的战略性经贸互利关	杨光	2014	4	1

中国低碳能源金融发展之主要问题探讨	高建良	2013	4	0
日本核电产业的演进逻辑：基于制度理论的分析	尹晓亮	2014	5	0
生物质能对化石能源的替代性——基于中国工业部门的实证分析	赵新刚, 刘平阔	2012	2	0
生物燃料替代化石燃料的影响因素研究--基于能源、粮食、环境视角的跨国面板数据分析	向涛, 李凯	2014	4	0
学无止境 奋斗不止	李新民	2014	2	1
我国合理控制能源消费总量实现途径研究--基于多目标优化视角	邹洋, 周江, 吴振明	2015	4	0
美国能源独立前景及对中国的影响	周云亨	2013	3	1
国外生物燃料发展政策及其对我国的启示	李元龙, 陆文聪	2011	4	0
“丝绸之路经济带”背景下中国与中亚国家的经贸互利合作	程贵, 丁志杰	2015	4	1
欧盟气候-能源政策的批判性分析	赵佳美	2012	1	0
海上战略通道对中国经济安全的影响及对策	王历荣	2015	4	1
中国--伊朗石油贸易风险与应对	薛静静, 杨兴礼, 梁艳桃	2011	4	1
在发展战略性新兴产业中积极作为	朱永芄	2011	4	0
俄罗斯面向亚太的东部能源开发战略及中俄合作研究	朱显平, 刘锋, 吴慧君	2014	3	1
原油金融化的定义、特征及潜在风险研究	侯明扬	2013	4	1
论能源危机对欧盟能源应急法律政策发展的影响	程荃	2015	2	0
能源安全观与中欧对非能源可持续开发模式比较	席桂桂, 陈水胜	2014	3	0
后金融危机时代印度能源外交战略及启示	张雷	2011	2	0
基于南海局势的我国能源战略发展方向及其相关投资领域	王征	2015	4	0
低碳能源安全：人类本体性存在与发展的安全意识转向	刘宽红	2011	2	0
Climate Change and Global Governance EU and China: Destined to Be Partners in Shaping the Post-Kyoto Regime?	Gu Xuewu	2014	1	0
中国天然气产业发展研究述评	闫艳	2015	2	1
全球能源治理的功利主义和全球主义	于宏源	2013	3	0
“能源经济与气候政策”栏目介绍		2012	2	0
美国能源独立趋势的全球影响	徐小杰	2013	3	1
欧盟 2020 战略与欧盟的低碳经济发展	陈俊荣	2011	3	0
国际海洋可再生能源发展及其对我国的启示	晏清	2012	4	1
国际原油价差中的政治因素	刘悦	2013	4	1

推进“二次跨越”实现科学发展	王宜林	2012	3	1
我国能源生产和消费革命势在必行		2014	4	0
在学习创新中推动发展方式转变	刘振亚	2011	2	0
新型城镇化道路的碳预算管理	潘家华	2013	4	0
国务院研究部署控制能源消费总量		2013	2	0
以转型推进能源企业的可持续发展	曹培玺	2015	2	0
行政垄断与我国能源发展战略研究——兼论民间资本进入能源垄断行业及其制度创新	陶广峰	2011	4	0
核事故、能源结构调整与国际气候合作	王伟男	2012	2	0
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