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THE CHINA'S ENERGY SECURITY IN THE ASIA-PACIFIC REGION IN THE 21ST CENTURY

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The main objective of this article was to determine the level of the Chinese energy security that was built up for last several decades. In order to reach the set aim the author figured the current condition of the energy sector within the leading states of the Asia-Pacific Region and compared it with a similar condition of China. The condition's characteristics included the following: Chinese energy balance, oil production, import and consumption, energy efficiency, CO2 emissions, electricity amount produced by using the renewable energy sources (hydropower, wind energy, sun energy) and nuclear energy. In addition the authorities' plans for the expansion of the mentioned renewable and nuclear energy production were as well discovered. The probable threats of the energy security and possible obstacles for the extensive means of sustaining the country's energy security were also brought up.

Statistical, comparative and analytical methods were applied in the process of the current research. As a result the PRC was found to be at a threshold to energetic crisis. In order to avoid the scenario two innovative methods were proposed as the means of avoiding the possible future crisis and sustaining energy security.

The research results can be applied in determining the domestic and foreign policy of China as well as the foreign policies of the PRC's energetic partners both within the Asia-Pacific Region and beyond its borders.

Keywords: China, energy security in the Asia-Pacific Region, coal, oil, gas, nuclear power and renewable energy sources: hydropower, energy of the sun and wind.

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ЭНЕРГЕТИЧЕСКАЯ БЕЗОПАСНОСТЬ КНР В АЗИАТСКО-ТИХООКЕАНСКОМ РЕГИОНЕ В 21 ВЕКЕ

Красанцов Е.С.

Цель представленной работы – определить уровень энергетической безопасности Китая, сложившийся за последние десятилетия. Для достижения поставленной цели автор установил нынешнее состояние энергетического сектора передовых стран Азиатско-Тихоокеанского региона для дальнейшего сравнения с подобными характеристиками в Китае. Данные характеристики включали в себя: параметры топливно-энергетического баланса Китая, объемы добычи, доставки и потребления нефти, энергоэффективность, объемы выбросов вредных веществ в атмосферу, объемы производства энергии за счет возобновляемых ресурсов (гидроэнергетика, ветряная энергетика, солнечная энергетика) и ядерной энергии и планы правительства по расширению их доли в общем объеме топливно-энергетического баланса страны. Выявлены основные угрозы и очерчены предположительные препятствия на пути расширения, применяемого китайским правительством, экстенсивного подхода в деле поддержания энергетической безопасности страны.

В ходе исследования применялись статистический, аналитический и сравнительный методы работы. Результатом работы стало нахождения Китая на пороге энергетического кризиса, для избежания которого необходимы срочные меры во всех сферах и прежде всего в политической. После чего были предложены возможные пути преодоления предполагаемого будущего энергетического кризиса Китая.

Результаты данного исследования могут найти свое применение как при определении внешне/внутриполитического курса Китая, так и внешней политики энергетических партнеров КНР как внутри Азиатско-Тихоокеанского региона, так и за его пределами.

Ключевые слова: Китай, энергетическая безопасность в Азиатско-Тихоокеанском регионе, уголь, нефть, газ, ядерная энергия и возобновляемые энергоресурсы: гидроэнергетика, энергия ветра и солнца.

Energy security is a rather blurry notion. Up to this moment the world community was incapable to give it any concrete definition. In the current article the energy security is construed as a stable condition of a state's energy sector (stable energy supply provided to its citizens via the means of production and refinery of energy resources, production of electricity and/or its well-functioning supply from abroad) and also as possessing the capability of resolving any issues risen in collateral spheres due to the effects of the human energy demand (e.g. environment).

The given article has two main objectives:

1) Compare the main energy sector characteristics of China and other leading states of the Asia-Pacific Region (APR);

2) Determine the current level of energy security in China by bringing up possible threats and ways of their overcoming, which will help in the nearest future either to resolve the problem or bring China to its energy insecure state.

So, in the 21st century the term "Energy security" is more often used with regard to the Asia-Pacific region. It is so because many APR developing countries are developing states with a fast paced economic growth that usually causes an increasing demand for energy sources. It is especially the case about the states that are in the process of industrialization with big manufacturing capacities like China. For instance in 2008 the ten biggest APR economies (namely United States, China, Japan, Russia, India, South Korea, Mexico, Australia, Canada, and Indonesia) accounted for 61% of the world's energy consumption [1].

The regional energy demand grows swiftly especially when it comes to China and India. The trend here is really stunning as just about three decades ago in 1980 they accounted for less than 8% of the world's energy consumption. By 2005 their share reached 18%. By 2030 it is expected that the two states will account for 25% of

the world's energy demand. Projecting into the future it's needless to say that the Chinese and Indian economic growth alone will significantly change the world's energy map. However, it's also worth taking another example, the most vivid of which would be the U.S. In 2008 its share of the world's energy consumption was already over 20% [13]. It means that using the most modest calculation method by 2030 the three countries' demand could be far over 40% approaching the level of a half of the overall global energy demand.

Another thing that requires a closer observation is the sources variety of the world energy consumption, which could be better described as monotony. Here we can see that the vast majority of the world energy (87%) in 2011 was mainly acquired by burning fossil fuels such as oil, coal and natural gas, which leaves only 13% for the remaining energy sources [3].

In the given situation of a weak diversification, the countries focus their attention on a narrow circle of hydrocarbon energy sources, which they have to share with each other. The escalation of such "energy race" has a great potential in the APR as the main energy users are located within the region. In 2012 the top four largest regional oil consumers – the US, China, Japan and India – accounted for 41% of the world's oil demand, whereas possessed even less than 4% of the world's oil reserves [4].

However, it is not only the question of supply that can look preoccupying. It is also the way the countries make use of their possessed energy sources. Unfortunately the majority of the APR states do not use their resources in an environmentally friendly way or efficiently enough, which they acquired from their partners signing different procurement contracts or straight from the "nature". Thus, for example in 2009 the mentioned APR "big ten" (the US, China, Japan, India, South Korea, Indonesia, Russia, Australia, Canada, Mexico) produced 54% of the world's GDP while accounting for 66% of the produced carbon dioxide (CO2) emissions in the world. At the same time it is worth mentioning that the level of efficiency and pollution production among the main APR actors varies drastically (see Table 1).

Table 1

Selected indices for the ten Asia-Pacific countries

	Population (mln, 2009)	Nominal GDP (billion US$, 2009)	Energy consumption (mtoe*, 2008)	CO2 emissions (billion tons, 2008)	Energy efficiency (mtoe/$1000 of GDP)	Carbon intensity (tons CO2/$1000 of GDP)
Australia	22,339.7	997.2	118.3	437.4	118.63	438.63
Canada	34,098.0	1,336.4	329.8	573.5	246.78	429.14
China	1,337,420.0	4,909.0	2,002.5	6,533.6	407.92	1,330.94
India	1,180,631.0	1,236.0	433.3	1,494.9	350.57	1,209.47
Indonesia	231,369.5	539.4	124.4	434.1	230.63	804.78
Japan	127,390.0	5,068.1	507.5	1,214.2	100.14	239.58
Mexico	107,550.7	874.9	170.4	444.6	194.77	508.17
Russia	141,927.3	1,229.2	684.6	1,729.4	556.95	1,406.93
South Korea	49,773.1	832.5	240.1	542.1	288.41	651.17
United States	309,237.0	14,256.3	2,299.0	5,832.8	161.26	409.14
AP 10	3,541,736.3	31,279.0	6,909.9	19,236.6	220.91	615.00
World total	6,820,000.0	57,937.5	11,294.9	29,195.0	194.95	503.91
AP 10 share	51.93%	53.99%	61.18%	65.89%	n.a.	n.a.

Sources: BP, June 2009; EIA, 2009; IMF, 2009.

*Mtoe - million tons of oil equivalent

For illustration purposes it's necessary to show the difference between the most efficient and the less pollutant state and its polarity. Here Japan was more than 5 times as energy efficient as Russia and more than 5 times less pollutant in terms of CO2 emissions than China (see Table 1). A simple explanation for this tendency to take place in the low income countries like Russia, China and India would be a weak

diversification in their fuel-energy balance plans, which makes them vastly dependent on the carbon-intensive resources. Another reason for this established pattern would be the carbon resources abundance in Russia and their accessibility and affordability in China and India.

Though, the matter of who needs more energy is quite debatable and thus in order to bring more objectiveness it is necessary to consider another side of the matter as well. For example if we look at the statistics at a different angle the picture becomes even more dramatic for China. One of the main roles that energy resources play is an electricity source and for sustainable energy security of a state the amount of electric energy demand is significantly important. Among the three electricity consumption "giants" of the APR – USA, China, India – Washington has already given up its unfortunate leadership and passed it to China.

Table 2

Energy consumption in the United States, China, and India, 1990-2035 in qbtu (Quadrillion of British Thermal Units* = 1 followed by 15 zeros)

Year	USA	China	India
1990	84,0	27,0	8,8
1995	91,2	34,8	12,4
2000	99,0	36,4	14,5
2005	100,5	68,3	17,5
2010	97,8	104,6	23,8
2015	102,0	124,2	27,8
2020	104,9	140,6	33,1
2025	108,0	160,9	38,9
2030	111,0	177,9	44,3
2035	114,2	191,4	49,2

Source: EIA. September 2011

*British Thermal Unit is a unit enough to boil one pound (0.454 kg) of water in normal conditions. 1 btu = 0.29 watt hours

In 2009 China overran the United States in its electric energy demand and in 2010 China set hard in its first place. In that year the U.S. used about 98 quadrillion of British Thermal Unit (qbtu) while China used almost 105 qbtu. In this regard the EIA foresees China to grow economically so fast as to almost double the aforementioned figure reaching the necessity of 191,4 qbtu by 2035 whereas the White House will be just at the point of 114,2 qbtu (see Table 2). At this point the aforementioned demand for energy resources is rather understandable when we consider the China's demand for electricity in general.

Hereby, the instability in the region is mainly caused by the lack of the energy offer and the grow trend of the energy demand. The situation is getting worse due to the fact that sooner or later suppliers will reach their limit of capability to provide the requested amount of energy resources, which consequently may lead to a conflict or even an open confrontation.

All these energy threats make Beijing ponder over a serious question – how to evade the worst scenario? First, we should understand the dimension of the approaching energy threat and then determine possible ways of resolving the problem. Historically China prefers to use an extensive way of solving the energy security issues, which stipulates expanding of the resources production and refinery of hydrocarbon energy sources as well as of its import share. This method proved to be effective with time. However, it also has its limits.

Starting soon after the establishment of the People's Republic of China it almost completely relied on coal as its main source of energy consumption. Nowadays the situation hasn't changed too much as in 2011 coal being accompanied by oil still occupied an absolute part of the country's energy consumption balance – 87%. Nevertheless, starting from the 90th Chinese government did adopt a new energy course in its policy attempting to gradually enlarge the share of renewable and nuclear energy (see Table 3). There could be several reasons for this.

Table 3

The PRC's Energy Consumption Balance 1980-2011 (%)

Year	Coal	Oil	Gas	Water, wind and nuclear energy
1980	72.2	20.7	3.1	4
1985	75.8	17.1	2.2	4.9
1990	76.2	16.6	2.1	5.1
1995	74.6	17.5	1.8	6.1
2000	67.8	23.2	2.4	6.7
2005	69.1	21	2.8	7.1
2010	68	19	4.4	8.6
2011	68.4	18.6	5	8

Source : China Statistical Year Book of Energy Consumption Balance for 1980-2011 (1980-2011 年历年全国能 源消费总量及构成).

When it comes to coal the reasoning is rather self-evident. Coal is cheap, the Chinese coal reserves are rather extensive (13.3% of the world reserves) and due to a relative simplicity of its extraction and usage coal came to become a leader in the Chinese energy consumption table. China now is the biggest coal producer (47.5%) and consumer (50.2%) ever known in the world [4]. Nevertheless, it became quite a problem because of its usage hazardous repercussions regarding the country's environment being pushed it to its edge. Another problem is that coal needs to be transported from province to province and due to its solid nature coal becomes a heavy burden on the transport infrastructure's shoulders.

Right after coal, in terms of the size of its application, there is oil. The extensive method on this path has its obstacles as well. Starting from the beginning of 1990th when China was still exporting oil the PRC reached the level when it has to import more than a half of its oil demand. In addition the shortfall between consumption and production – the extent to which they are reliant upon imports – is getting

dramatic. From 1965 to 2008 the consumption skyrocketed 37 times, though its production increased only 17 times [2]. Plus, we should also take into account the predictions that by 2030 the China's annual oil consumption must more than double and Chinese leaders will need to source additional 8.6 mbpd from abroad [16, p. 381]. At the same time the relatively stagnant domestic production makes us realize that the production-consumption gap will grow enormously.

The production whereas has relatively moderate pace of growth considering the limited Chinese reserves of oil and the difficulty of their extraction and transportation. In 2012 China possessed 2.1 billion tons of proved oil reserves, which accounted only for 1% of the world's total reserves [4]. These figures apparently lack objective basis to be called sufficient for such country as China. Thus, if all the predictions come true we can say that from the supply side of the term "energy security" China is about to face serious problems.

The PRC also remains in a rather vulnerable position in terms of oil logistics as over a half of its imports is brought from the restless Middle East and North Africa (see Table 4).

Table 4

China's Crude Oil Import by Source, 2010. (%)

Saudi Arabia	19
Angola	16
Iran	9
Oman	7
Russia	6
Sudan	5
Iraq	5
Kuwait	4
Kazakhstan	4
Brazil	3
Libya	3
Others	19

Source: EIA, May 2011

Last row of conflicts there seriously shook the China's energy supply balance and particularly the share of Libya's supply after the recent prominent war vanished away – from 3% to almost 0% [8]. In addition to this over 85% of these imports are transported using strategic shipping routes through Suez, Hormuz and the Straits of Malacca, which means that any relatively serious conflict can significantly disrupt the Chinese energy sources imports. Taking into account the unstable character of today's international system the scenario in which some actor would cause such conflict for his personal gain is rather implementable.

Not to forget about the dilemma of the oil price shocks that periodically took place in different periods of modern history, being accompanied by flying up and crashing down oil prices. Though, the latter factor should be treated accurately as China often perceives such occasion not as much as a crisis itself but more as an opportunity. In the two Chinese characters **"危机"** (weiji) that could be translated as "crisis" each has its own meaning, which is "danger" and "opportunity" or in our own consideration can mean – dangerous but still an opportunity. In this regards during last financial crisis in 2008 the Chinese government made a broad investment move to buy a vast amount of cheap oil futures and, hence, increased its consumption of primary energy by 7.2%, accounting for approximately 3/4 of the world's energy consumption growth at that time [1].

Another possible alternative for oil could become natural gas, which is still rather abundant in the world and in the APR due to great reserves of Russia. The gas production and import grows constantly in China but its consumption share is still less than any of coal or even oil. The most explicable reason is its commercial side. Even though recently there were discovered vast amounts of shale gas its price is significantly higher than the one for coal while oil is more compatible as its price is at least somehow controlled by oil market. So, prices on gas are usually dictated by its owners and there are no set transparent rules for price estimation. Additionally the Chinese economy hasn't been adapted yet to serious amounts of gas usage due to the lack of a spread distribution system.

The given situation forced China to come up with some means to avoid a negative aftermath of the coming energy crisis. So, one of the possible short-term solutions, which Chinese authorities decided to implement, was to start building up strategic petroleum reserves (SPR). This decision was made about a decade ago, however the project is still in progress and there are no serious SPR in China so far. As planned by the government the state reserves of 500 million barrels will provide around 90 days of consumption by 2020 in case of emergency with no oil import [5].

In case these plans were implemented China would catch up with the other Asia-Pacific states such as Japan, South Korea and Australia, countries, which already maintain mandatory stocks of oil equivalent to at least 90 days of net oil imports. Another example is the U.S.'s SPR. In 2006 the oil reservoirs contained 688 million barrels, providing about a 55-day supply of oil imports at the 2005 U.S. rates of consumption [20].

We must not forget of course that energy sources are not limited to oil, gas and coal. China as the majority of countries in the world also has its program to develop production of renewable energy such as hydro, wind, solar, plus non-renewable but available in abundance – nuclear power. According to Li Junfeng, deputy director of the Energy Research Institute of the National Development and Reform Commission, in 2011 non-fossil fuels accounted for 9.4% of China's total energy consumption. Even though there are no ambitious short-term plans among Chinese authorities to significantly increase the share of renewables there is still stable growth. Some of them expect these figures to keep the upstream direction up to 11,4% by 2015 [18]. Some of international sources at the same time view this share to rise up to 15% by 2020 [19, p.192].

When it comes specifically to hydropower its share increased from almost nothing – 1% in 1949 – to about 8% in 2010, producing 213 million kilowatt [17]. Remarkably this small percentage share in the PRC energy apportionment makes China the largest producer of hydropower in the world. Wind energy production in its turn also received a rising trend by doubling every year in the past several years. In

2011 China made itself a global market leader in wind energy accumulating 62 million kw [14]. Chinese share of solar energy is relatively small – it was just nearly 900 megawatts in 2008. However, Chinese government has broad scale plans to rectify the situation and multiply its capacity to 20 or even 30 gigawatts by 2020 [10].

When it comes to nuclear energy although Beijing temporarily suspended its program due to the Fukushima events it never stopped it entirely. Recently the authorities reiterated their determination to continue with the nuclear program implementation. In 2011 China was able to generate around 8.6 GWe. According to the plans there must be made a big leap forward. The road map of the nuclear energy development looks as following: 60-70 GWe by 2020, 200 GWe by 2030, 400-500 GWe by 2050 and 1400 GWe by 2100 [15].

However, even though all these projected figures and numbers look impressive, they still remain only on paper playing a role of nothing more than an orientation point for the future. The current reality is still tightly connected to fossil fuels and China's dependence on foreign energy will continue increasing as there is no other fruitful way found to satisfy its booming demand for energy.

As an innovative way of making its energy security sustainable China can enlarge the dimension of its coal liquefaction program. The program may come to be fruitful in the nearest future. Its perspective features lie in the fact that China has large coal reserves and the final product proved to be even cleaner than EURO 5 standards and thus being less pollutant than any hydrocarbon products including natural gas. This way has lots of benefits: it can help China to avoid the necessity of future changes in its energy consumption balance saving and even expanding work places in the coal industry, enhance the harmed environment by many times, ease the transport infrastructure by having liquid coal transported using pipelines. The latter point can also become useful in terms of bringing China to energy market exporting its own product to other APR countries like Japan and Korea. Though, the program is still running under a pilot project status and the main problem so far is its incompatibility in terms of price of the final product comparing it to oil products.

Another promising way out could be a search of new reserves of energy resources and new logistic routes going to China. One of such places could be the Arctic Sea, which is rather rich in terms of energy sources. The Chinese government was strongly encouraged by its researchers to be involved more actively in this region. And the motivation here is really worthy as the region is said to possess 13% of the world's oil and 30% of its gas [12]. The main issue is that the resources in the area are highly difficult to reach not saying about their extraction plus it is difficult due to a lack of cooperation in the area.

Therefore, despite the growing diversity in energy sources and the fact that China holds leading position of the top world's largest coal producers/consumers, wind-power and hydropower producers and the second biggest crude oil importer plus the fourth largest oil producer it still appears to be insufficient to preserve an equal mind about the energy security even for the coming future. In this regard, eventually a risen question of whether China's economic miracle is politically and socially sustainable seems to have its logical basis. It is rather apparent that with this pace of economic development China's energy demand will shape the world's energy map. Will the Chinese measures be enough to successfully face this challenge and overcome its highly undesirable consequences? It is the question that China and its partner-countries will need to find an answer to.

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