

The rise of china and its energy supply

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Chapter V

Abstract

This chapter aims to go into one of the events with most geostrategic significance of the first half of this century that undoubtedly will shape the geopolitical future of its second half.

The international community follows and discusses in detail the plans and actions of the Chinese authorities to solve the “energy trilemma: ensuring competitive energy supply, while providing universal access to energy and promoting environmental protection”, with a clearly marked target, “the Chinese dream”, the socio-economic welfare to the medium-level developed countries in 2049, the centenary of the foundation of the People’s Republic of China.

To achieve it, the Chinese government faces two basic challenges, economic continuous development and social unrest by environmental degradation. Both have a common element, energy supply, thus becomes a key factor for the survival of the one party model, the Chinese Communist Party that requires the stability of an international scenario that must adapt and accept, peacefully, the appearance, to stay, of the new geopolitical giant.

This work intends to analyse this exciting geostrategic challenge, recognizing the limitations of space and time, but hoping to put into the geo-

litical discussion one of those major events “bearers of the future” for the international relations.

Keywords

China, Energy, Geopolitical, Geostrategic, Development, Climate Change, Technology, Conflict.

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"...Prudence and patience are part of China's imperial DNA. But China is also ambitious, proud, and conscious that its unique history is but a prologue to its destiny. No wonder then that in a burst of candour an astute Chinese public figure, who obviously had concluded that America's decline and China's rise were both inevitable, not long ago soberly noted to a visiting American: "But, please, let America not decline too quickly..."¹

Introduction

"Today, power in the world is distributed in a pattern that resembles a complex three-dimensional chess game. On the top chess-board, military power is largely unipolar and the United States is likely to remain supreme for some time. But on the middle chess-board, economic power has been multipolar for more than a decade, with the United States, Europe, Japan, and China as the major players, and with others gaining in importance... The bottom chessboard is the realm of transnational relations that cross borders outside of government control, and it includes non-state actors... This chessboard also includes new transnational challenges such as pandemics and climate change. On this bottom board, power is widely diffused, and it makes no sense to speak here of unipolarity, multipolarity, hegemony, or any other such clichés that political leaders and pundits put in their speeches.

Two great power shifts are occurring in this century: a power transition among states and a power diffusion away from all states to non-state actors... successful economic performance such as that of China can produce both the hard power of sanctions and restricted market access and the soft power of attraction and emulation of success."²

China, without any doubt, has become the fundamental geo-strategic factor for understanding the geo-political framework of the first half of the 21st Century. The policies of the Asiatic giant attract the immediate attention of all chancelleries, international organisations and the media in all social spheres. At the same time, as official statistics and estimates of all kinds are analysed down to the tiniest detail, a dilemma is made clear, which will accompany us throughout this chapter, the transparency

¹ ZBIGNIEW, Brzezinski. "Strategic Vision. America and the Crisis of Global Power". 2012. Basic Books. New York. Page 81

² NYE Jr, Joseph S, (2011). "The future of power". New York, United States by Public Affairs. Pages: XV&22. Professor Nye has coined the terms: "soft", "hard" and "smart power."

and reliability of data which aim to show an unstoppable rise, and which project harmonious development in a stable and peaceful environment.

A progress which began with the reformist policies of Deng Xiaoping in 1979, making a break with the revolutionary dynamic and the economic stagnation imposed by Mao Zedong from the triumph of the Communist Party and the consequent creation of the People's Republic of China in 1949. Deng Xiaoping began the path to growth of Chinese society on a social base which was traumatised due to the successive revolutionary policies designed by the "great helmsman" in his obsessive search for revolutionary purity. The historical intersection of a people in continuous revolutionary tension with a highly ambitious, centralised and firmly directed economic liberalisation is benefitting from a great window of opportunity. The evolution of the western economies towards service and consumer societies which leave a large scope of action to the industrial development of a society which is hungry for progress, in a unique symbiosis, which even today surprises political and economic analysts due to its intensity and duration.

But, as Marta Camacho Parejo³ rightly points out: "*the protagonist of the progress, development and growth of our societies, from both an industrial and social point of view, is energy, which acts as an element of centrality.*"

In the above-mentioned document, a synthesis is made of the studies which the World Energy Council has been publishing since 2008 and which have been known since 2012 as:

*"...the energy trilemma... [referring] to the complicated objectives which face governments to ensure competitive energy supply, encouraging in turn universal access to energy and promoting environmental protection. It therefore deals with three fundamental aspects of energy: security of supply, social equity and the mitigation of the environmental impact."*⁴

³ CAMACHO PAREJO, Marta. Secretary General of the Spanish Committee of the World Energy Council. "*El Trilema energético*". Offprint of no. 38 of the Energy Notebooks. 2012. Spanish Energy Club. Spanish Energy Institute.

⁴ Ibid., page xx.

- *Energy security: understood as the effective management of energy supply from national and external sources (both for net importers and exporters of energy), reliability of the energy infrastructure and the capacity of energy firms to satisfy current and future demand (for countries that are net exporters of energy, this also refers to the ability to maintain income from the markets for foreign sales);*
- *Social justice: which refers to the accessibility and attainability of energy supply for the whole of the population;*
- *Mitigation of environmental impact: energy efficiency and saving (from the point of view of both supply and demand) and development of the supply of renewable energies and other low-carbon sources.*

Into this context, the geopolitical reality of China (see table 5.1)⁵ shows a country whose energy consumption per capita is today similar to that of the United States in 1955. A reference which brings us to a geo-strategic vacuum to be developed, full of unimaginable possibilities which leave all institutions in suspense as they try, as Adam Siemininski⁶ recently said, “to accommodate” China’s energy growth without generating geo-political frictions which could lead to crises, in which the realist tendencies of a “zero sum” scenario predominate.

		MUNDIAL	CHINA	UE	EEUU	RUSIA
Area km ²		Area km ²	9.396.861 (48)	4.324.782 (78)	9.826.673 (38)	17.098.242 (18)
GDP (PPP)		GDP (PPP)	12.618 \$ (38)	15.978 \$ (18)	15.948 \$ (28)	2.333 \$ (78)
Agriculture		Agriculture	10,1%	1,8%	1,1%	4,2%
Industry		Industry	43,8%	23,8%	19,2%	37,3%
Services		Services	44,6%	72,9%	79,7%	58,3%
GDP - per capita -		GDP - per capita -	9.300\$ (1228)	35.100\$ (408)	30.700\$ (138)	18.000\$ (788)
GDP - real growth		GDP - real growth	7,8% (238)	-0,8% (1828)	2,2% (1188)	3,4% (1008)
Population - growth		Population - growth	1.349.383.838-12	309.365.627-32	316.668.567-48	142.900.482-108
			0,46%	0,21%	0,9%	-0,02%
Age structure:	0-14	26,0%	13,0%	15,41%	20,0%	16,0%
	15-55	57,4%	66,3%	53,70%	53,8%	57,4%
	55-OVER	16,6%	20,7%	30,89%	26,2%	26,6%
Urban population - growth		Urban population - growth	30,6%-2,85%	76%-0,74% ¹	82%-1,2%	73,8%-0,13%
GINI index		GINI index	47,4 (298)	30,7 (1128)	45 (418)	41,7 (328)
Life expectancy		Life expectancy	74,99 (1008)	79,86 (378)	78,62 (318)	69,83 (1528)
Internet users		Internet users	389M (18)	340 (28)	243M (38)	40,83M (108)
Mobile cellular		Mobile cellular	1.100M (18)	629M (28)	310M (38)	261,9M (38)
Poverty line		Poverty line	13,4% ²	0,7%-2,4% ⁴	1,3,1%	12,7%
Military: % PIB		Military: % PIB	2,6 (498)	1,6 (888) ²	4,6 (198)	3,9 (238)

Table 5.1

The new geo-strategic atmosphere, dominated by a scenario which Joseph Nye presents as a three-dimensional chessboard⁷, offers a unique opportunity to “accommodate” that potential growth, in such a manner that the second half of the 21st Century evolves in a gradual and progressive manner from a geo-strategic environment dominated by cooperative security towards an comprehensive vision of the reality and smart management of the environment via the concept of dynamic security (see figure 5.1)⁸, necessary for with the adaptation to the speed imposed by the information society in which we live, into a reality in constant change in which the objective is to achieve a set of geo-strategic pattern in line with the idealist “win-win” game.

⁵ Prepared by ourselves. Translation by the author. Information from: “The World Factbook”: <https://www.cia.gov/library/publications/the-world-factbook/geos/xx.html>

⁶ Administrator of the U.S. Energy Information Administration (EIA). Presentation from “EIA. International Energy Outlook 2013”.

⁷ See the quotation which introduces the first point.

⁸ Prepared by the author



Figure 5.1

A scenario in which the winner is sustainable human development (see figure 5.2), which, as was indicated by the Secretary General of the United Nations in 2012, the year of sustainable energy⁹ requires the international commitment of governments, civil society and the private sector to achieve: “Sustainable Energy for All by 2030... energy that is accessible, cleaner and more efficient... and paves a path out of poverty to greater prosperity for all”. According to the document:

“The historic energy transitions – first from human power to animal power, and then from animal power to mechanical power – were major shifts in the human journey toward greater productivity, prosperity, and comfort. It is unimaginable that today’s economies could function without electricity and other modern energy services. From job creation to economic development, from security concerns to the status of women, energy lies at the heart of all countries’ core interests... Countries

⁹ UN Sustainable Energy for all, <http://www.sustainableenergyforall.org/>. Fact Sheet: *The world currently invests more than \$1 trillion per year in energy, much of it going toward the energy systems of the past instead of building the clean energy economies of the future [while one-fifth of humanity currently lacks access to electricity]. The Secretary-General’s Sustainable Energy for All Initiative [2030] has three complementary objectives:*

- *Ensuring universal access to modern energy services.*
- *Doubling the global rate of improvement in energy efficiency.*
- *Doubling the share of renewable energy in the global energy mix.*

such as China, India, Nepal, Brazil, and South Africa are also leading the way with national initiatives".¹⁰

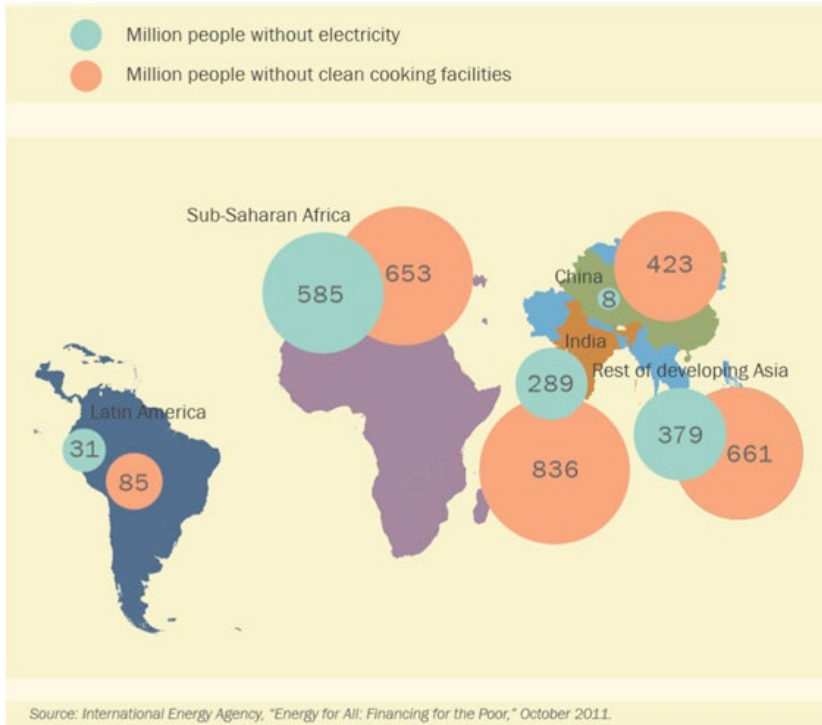


Figure 5.2

China in the global energy scenario

"... the overriding reality... in Madeleine Albright's description that China is in its own category, too big to ignore, too repressive to embrace, difficult to influence, and very, very proud."¹¹

Energy security is a global issue. Few countries can secure their energy supply without international cooperation. The achievements of China in energy development are inseparable from its friendly cooperation with other countries. Its future development in the energy sector will need more understanding and support from the international community. China, with a population of more than one billion, is exploring and practicing a new way in the history of energy development to ensure its

¹⁰ For a complete and systematic panorama of the most important data of the imbalances in access to energy in the world see: A Vision Statement by Ban Ki-moon, Secretary-General of the United Nations. "Sustainable energy for all". November 2011. Facts

¹¹ KISSINGER, Henry (2011). "On China". New York, the Penguin Press. Page 477.

*sustainable energy development. China did not, does not and will not pose any threat to the world's energy security. Abiding by the principle of equality, reciprocity and mutual benefit, it will further strengthen its cooperation with other energy producing and consuming countries as well as international energy organizations, and work together with them to promote a sustainable energy development around the world. It will strive to maintain stability of the international energy market and energy prices, secure the international energy transportation routes, and make due contributions to safeguarding international energy security and addressing global climate change.*¹²

It seems that the crossroads of destiny again favours the sustainable growth, of Chinese economy. In the latest reports of the International Monetary Fund, the great recession in the developed world appears to be starting to recede, with practically imperceptible, but much more stable and balanced, growth taking its path for the future (see table 5.2)¹³.

	2011	2012	Projections	
			2013	2014
World Output¹	4.0	3.2	3.3	4.0
Advanced Economies	1.6	1.2	1.2	2.2
United States	1.8	2.2	1.9	3.0
Euro Area	1.4	-0.6	-0.3	1.1
Germany	3.1	0.9	0.6	1.5
France	1.7	0.0	-0.1	0.9
Italy	0.4	-2.4	-1.5	0.5
Spain	0.4	-1.4	-1.6	0.7
Japan	-0.6	2.0	1.6	1.4
United Kingdom	0.9	0.2	0.7	1.5
Canada	2.6	1.8	1.5	2.4
Other Advanced Economies ²	3.3	1.8	2.5	3.4
Emerging Market and Developing Economies³	6.4	5.1	5.3	5.7
Central and Eastern Europe	5.2	1.6	2.2	2.8
Commonwealth of Independent States	4.8	3.4	3.4	4.0
Russia	4.3	3.4	3.4	3.8
Excluding Russia	6.1	3.3	3.5	4.6
Developing Asia	8.1	6.6	7.1	7.3
China	9.3	7.8	8.0	8.2
India	7.7	4.0	5.7	6.2
ASEAN-5 ⁴	4.5	6.1	5.9	5.5
Latin America and the Caribbean	4.6	3.0	3.4	3.9
Brazil	2.7	0.9	3.0	4.0
Mexico	3.9	3.9	3.4	3.4
Middle East, North Africa, Afghanistan, and Pakistan	3.9	4.7	3.1	3.7
Sub-Saharan Africa ⁵	5.3	4.8	5.6	6.1
South Africa	3.5	2.5	2.8	3.3

Table 5.2

In this scenario, China manages to restrain the accelerated growth of its economy, based on investment and exports with low productivity, in

¹² White Paper: "China's Energy Policy 2012". October 2012, Beijing. State Council

¹³ IMF. World Economic Outlook, April 2013. Hopes, realities and risks.

which the only sector open to investment for the incipient middle class is the real estate and where private property rights in land are subject to the discretion of local government. At the same time that global perspectives support China's adaptation to a more balanced desirable scenario, in which internal consumption, services and private and foreign investment in sectors considered strategic up to now, and therefore only open to state-owned companies, make it possible to advance towards the "Chinese dream". Xi Jinping has created from the vision¹⁴ of a renewed Chinese society, structured and supported by an ever more prosperous, educated and demanding middle class.

In the search for that scenario, China is facing its unquestionable reality.

"If the latest strategies of national security have included the economic dimension as one of their essential elements, in the Chinese case, the model of development features as the fundamental element of its national security. In this regard, it roundly declares that it is a demand of its citizens and a need which all countries must support. The strategy declares that the planned objectives have been achieved in their first two stages: doubling 1980's Gross Domestic Product (GDP) to attend to the basic needs of the population and increasing it fourfold at the end of the last century so as to achieve a basic level of prosperity. The third objective, which is set for the middle of the century, on the centenary of the foundation of the People's Republic of China (1949), would be the achievement through general prosperity and the modernization of the country of a harmonious State.

In this regard, China declares itself as a developing country and describes the base from which it is starting, both from the internal point of view and in its international relations.

From the internal point of view, it considers the objective titanic, bearing in mind the basic national conditions, which the document defines as a numerous population with a weak economic base: 20% of the world population, 7.9% of the agricultural land and 6.5% of the drinking

¹⁴ "It is our mission to fulfil the desire of [our people] for a happy life. It is only hard work that creates all the happiness in the world. In order to fulfil our responsibility, we will rally and lead the whole Party and the people of all ethnic groups in China in making continued efforts to free up our minds...and unwaveringly pursue common prosperity... our Party also faces many severe challenges, and there are also many pressing problems within the Party that need to be resolved, particularly corruption, being divorced from the people, going through formalities and bureaucracy caused by some Party officials..." Xi Jinping remarks on the Occasion of Meeting with the Chinese and Foreign Press by Members of the Standing Committee of the Political Bureau of the Eighteenth Central Committee of the Communist Party of China. http://www.china.org.cn/china/18th_cpc_congress/2012-11/16/content_27130032.htm Visited on 16th August 2013. Author's translation.

water... emphasizing the grave imbalances, the structural problems, the excessive dependency and vulnerability of the import of resources, and environmental problems.”¹⁵

In this context of sustainable economic development, energy becomes the backbone of growth, the vital blood flow of a body which has to grow continuously and balanced, facing a radically new scenario (see figure 5.3). An energy framework which, in the Asia-Pacific region, initially and very synthetically, could be considered as being made up of isolated energy islands without the vital characteristic of the porosity of a regional market, which is transformed by the amazing growth of the Asian giant and Japan's new energy mix.

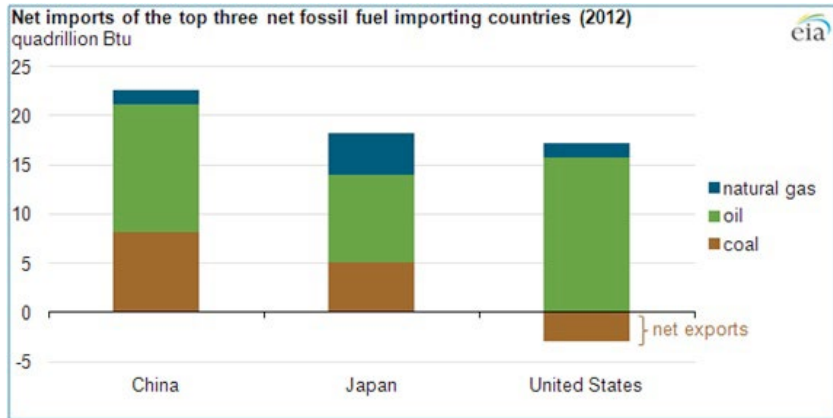


Figure 5.3

China gives the Asian market a continental character, in some ways with the same role that Europe plays in the Atlantic area, diversifying and strengthening its main sources of energy consumption, Japan, South Korea and Taiwan. At the same time, and with a global nature, the Asian market is shaped just like the European and American ones, with a clear tendency to surpass both of them in their supply needs. Furthermore, and as a consequence of the accident at the Fukushima nuclear power station and the consequent halting of nuclear activity, the regional capacity to act in an autonomous manner is clearly weakened, changing radically the energy nature of the region, from being considered extreme, isolated and independent to becoming the center of gravity in the global energy scenario.

¹⁵ GARCÍA SÁNCHEZ, Ignacio. Analysis document of the ieee.es 028/11. "Análisis de Estrategia China de Seguridad". Review of ieee.es, "White Paper: China's peaceful development". September 2011.

China's energy voracity. Asia: the market of the future

"We do have certain assumptions on how the Emission Trade System are introduced... interesting India is one of the few countries that doesn't have to reduce emissions from now and 2017, in fact Indian emissions are allowed to grow 35%. So it is a different situation... there are differences between the countries and the other countries are so small compared to China, China is really where we have to concentrate, just because the share of number of people, the share volume of its growth... China's emissions need to fall by a half. They need to be cut half... if it doesn't happen it is no way we can reach the 2° Celsius scenario. No way we can make it, we are in trouble..."¹⁶

During the last three decades, the Chinese economy has grown at an average rate of 9.9%, and has since 2010 exceeded the GDP of Japan to become the third economic power in the world behind the European Union and the United States. Although this growth, once distributed among the population, \$9,300, keeps it at a discreet position, 122nd, in the country comparison ranking. Still a long way from the \$50,700 of the United States (14th), the \$30,500 of the EU (41st) and slightly below the world average of \$12,700. But this amazing growth, which has allowed to take out of poverty over 650 million people¹⁷, has been achieved by paying a high price in terms of excessive consumption of energy resources, basically fossil fuels, and therefore warning levels of contamination.

The current figures speak for themselves, but the forecasts are even more amazing. 2018 and 2020 will be significant years in terms of socio-economic development, according to the forecasts of growth with an annual average rate of 5.4%, as the per capita income would respectively exceed: the critical level of development of the democracies, \$12,000; and the average world per capita income, \$13,624 in China vis-à-vis \$13,065 as the world average¹⁸.

¹⁶ 17 July 2012. The CSIS Energy and National Security Program hosted Ambassador Richard H. Jones, Deputy Executive Director and Dr. Markus Wrake, Senior Energy Analyst and ETP Project Lead, International Energy Agency (IEA) to present the IEA's Energy Technology Perspectives 2012.

Energy Technology Perspectives 2012 (ETP 2012) looks at how technologies-- from electric vehicles to smart grids-- can make a decisive difference in achieving the objective of limiting the global temperature rise to 2°C and enhancing energy security.

¹⁷ In accordance with the data from table 5.1, the official number of Chinese citizens living in poverty, 13.4%, amounts to over 180 million people.

¹⁸ Reference scenario of

<http://www.eia.gov/oiaf/aeo/tablebrowser/#release=IEO2013&subject=0-IEO2013&table=42-IEO2013®ion=0-0&cases=Reference-d041117>, visited on 6th November 2013.

At nearly 5 trillion¹⁹ kWh, China is the world's largest producer and consumer of electrical energy²⁰, with the US in second position at a little more than four trillion kWh and the EU in third place with three trillion kWh.

China is the world's largest energy consumer with 115,500 trillion Btu²¹, 21.3% of the world total of 540,400 trillion btu, approximately equal to the consumption of all the OECD countries in America²², and way ahead of European consumption and the total of all other Asiatic powers. The problem is that in this consumption, the most important single source is coal, at 79,200 trillion btu, approximately equal to half of world consumption²³ and growing at a faster rate, 1.9% and 1.3% respectively, with the result that by 2040 it might have grown to reach 121,500 trillion btu (55.35% of the world total).

In 2013, a consumption of 11 million barrels of liquid fossil fuels a day is estimated, behind the 14 Mbl of Europe and 18 Mbl of the US, although with an annual average increase of 2.5%, it is expected that it will surpass the US in 2040, when China will become the world's largest consumer at 20 million barrels a day, which represents 17.4% of world consumption as opposed to 11% today.

One of the great weaknesses of Chinese energy consumption is natural gas. At 4.7 trillion cubic feet (4% of world consumption) it is at the level of Japan but far below Europe and the US, at 19.6 Tcf and 25.3 Tcf respectively. However, the interest of the Chinese authorities and the enormous potential growth, of up to 5.3%, above all talking into account the potential for unconventional gas use, would make it possible by 2040 to reach 17.5 Tcf (9.5%), which would still be below Europe's 24.5 Tcf and the 29.5 Tcf of the US.

China's great strengths, taking into account the serious environmental problem, are in the consumption of clean energy sources, such as hydro-electric energy and renewable energies, which amount to a total of 9.7 quintillion Btu²⁴ (15.5% of world consumption), above the 7.8 quintillion btu of the US and below the 11.9 quintillion btu of Europe. Furthermore, boosted by the 12th Five-Year Plan covering the period 2011-2015, China's renewables growth is greater than that for other countries

¹⁹ A trillion is one thousand billion, expressed as one followed by twelve zeros

²⁰ That of electrical energy is obtained from: 69.5% fossil fuels, 1.1% nuclear, 21.8% from hydro-electric plants and 7.6% from renewable sources.
<https://www.cia.gov/library/publications/the-world-factbook/geos/ch.html>, visited on 6th November 2013.

²¹ BTU: British Thermal Unit

²² Canada, United States, Mexico and Chile

²³ World consumption is 154,000 billion btu. (The figure expected for 2040 by the EIA of the US is 219,500 billion btu, with an average growth of 1.3%)

²⁴ Quintillion: one million of trillions, expressed with 1 followed by 18 zeros

at a 4% annual average, which would lead it to equal Europe in 2016 to achieve 26.2 trillion btu in 2040, 22% of the world consumption. Also, with the aim of reducing the CO₂ footprint, nuclear energy is one of the sources of energy with the greatest growth. At 190,000 million kWh, 7.3% of world consumption, its growth, at an annual rate of 10.2%, would lead it in 2040 to be the world's largest consumer of nuclear energy, with 1.289 billion kWh, almost a quarter, 23.5%, of world consumption.

Despite the great effort in renewables and energy efficiency, which would lead it to reduce its energy intensity at an annual average rate of -2.9 %, above the estimated world annual rate of -2%, the CO₂ emissions will continue to grow at an annual rate of 2.3 %, greater than the annual average of 1.3 %, essentially driven by the sustained growth that would lead in 2040 to a China's per capita income of \$35,573, with an estimated world average of \$23,330 and emissions of 14,911 million tons, one third, 32.8 %, of the world total.

China's economic development generates a dynamic growth in the entire Asia-Pacific area, which is global, reaching, the majority of the economies of sub-Saharan Africa and many Latin American countries (see figure 5.4)²⁵.

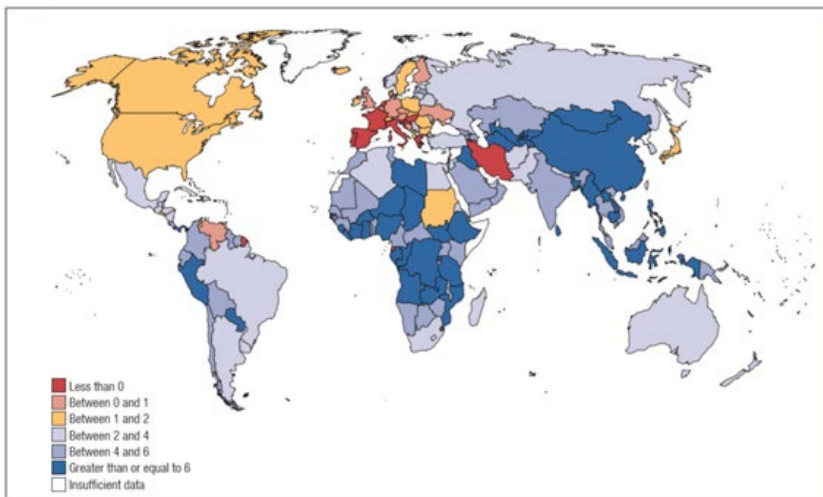


Figure 5.4

But this growth is also fundamentally affected by a dynamic which substantially alters the energy panorama. The halting of its nuclear power stations has obliged Japan to become a net importer of fossil fuels. With

²⁵ IMF. April 2013: "World economic outlook: hopes, realities, risks". In 2012, Asia grew by 5.3% and the forecasts for 2013 and 2014 are: 5.75% and 6% respectively.

only 15% of its consumption guaranteed with its own resources, it has become the third most significant oil importing country, at 4.6 million barrels a day, just behind China and the United States, the most significant in imports of Liquefied Natural Gas (LNG), with 37% of world consumption, and the second most significant importer of coal, used to generate 27 % of electrical energy²⁶.

In this scenario, while the coal and oil markets are of a global nature and the price, with slight variations, is the same in the different regional markets, the price of gas behaves in a different way, with a variation which is five times greater in Asia than in the United States, and twice as much as in Europe. This high price, which is modifying the export routes so as to supply the Asian market, endangers its expansion in the Chinese market. So much so that, for example, and although of a testimonial nature, Europe has seen an increase in the consumption of coal at the expense of natural gas, which goes to a more advantageous market, the Asian one.

China, a key geopolitical factor in the energy panorama. The geo-strategy of the future

"...a future that presents us with a security paradox. While the world is tending towards greater stability overall... the world is potentially more dangerous than ever before"²⁷

As the 40th anniversary of the first, and so far only, Arab oil embargo²⁸, has passed and its geo-strategic impact continues to reverberate, it puts into perspective a changing, heterogeneous and fundamentally different scenario.

The economic impact produced a severe recession which went on until 1975 in the United States, with a reduction of 2.5% in GDP and significant increases in unemployment and inflation. However, the geo-political con-

²⁶ EIA. 7th November 2013. "Japan is the second largest net importer of fossil fuels in the world". "Japan had been the largest global coal importer for three decades until 2011, when, according to World Coal Association estimates, China surpassed Japan by a narrow margin. By 2012, this gap widened as Chinese coal imports grew."

²⁷ Capstone Concept for Joint Operations: Joint Force 2020. (Joint Chiefs of Staff). Washington. 10th September 2012.

²⁸ On 6th October 1973, the Yom Kippur War began with the surprise attack by Syria and Egypt on Israel. On the nineteenth, when the U.S. Congress authorised an aid of \$2.2 billion to Israel, OAPC (the Organisation of Arab Petroleum Exporting Countries) together with Syria, Egypt and Tunisia, imposed a total oil embargo on the U.S. and a selective embargo on the other western countries and Japan. On 18th January 1974, Israel signed an agreement on a withdrawal from the eastern side of the Suez Canal, which was completed in March, when the ministers of the Arab countries, with the exception of Libya, announced the end of the embargo and an increase in production and export of crude.

sequences were deeper, changing radically the scenario of confidence in the non-use of a resource, considered vital, as a geo-strategic vector of dramatic consequences.

We have likewise seen the entry onto the strategy scene of new actors, Canada, the North Sea, the Gulf of Mexico... which have broadened the distribution of the enormous power involved in having the key to the most important energy source due to its calorific density, oil. There has also been a notable change in the industrial policies of the developed countries, above all Japan, with a great determination at any price to transform the model from industrial sectors that are highly dependent on oil to high-technology sectors as well as the search for alternative sources of energy such as nuclear energy.

Other geo-political lessons which have remained to the present might be synthesized as:

- the confirmation of the energy as the backbone of economic development;
- the palpable demonstration of the ever-growing economic globalization and integration of markets, where the recession in the western countries can be felt globally,
- innovation and more efficient use of energy resources, which has led to a progressive reduction in energy intensity at an average rate of 2%, with a continuous, although slight, progressive loss of the geo-political weight of so-called black gold. In this regard, the American Energy Secretary reminded us recently that the measures taken at that time about the efficiency standards for the car industry (CAFE, efficiency standards for cars) has led us to achieve, instead of the eleven miles a gallon then, twenty-five miles a gallon now, with the objective of over fifty in 2025;
- the accelerated development and deployment of alternative fuels and the withdrawal of price controls;
- the search for a system of global governance of energy, which led to the creation of the International Energy Agency (IEA) and the establishment of strategic reserves;
- the revitalization in the use of coal as a fundamental factor of National Security which, again in the words of the US Secretary of State, should lead us to think twice about the positions that are adopted in discussions on climate change, with regard to the policies of certain countries with circumstances that are not very different from those of the western countries at that time.

Thus began a traumatic geo-political journey, in which there have been continual crises and instability which have used a vital resource for de-

velopment and global prosperity as a key factor to of political pressure. This path has led to a strategic paradox, the lack of resources and the growing demand for them, which leads to two objectives which might be understood as exclusive, energy independence/autonomy and the search for global energy governance within a market which is more free, integrated and interconnected.

Another geo-political fact of great transcendence, which it is worth remembering from that time, is the opening up of China to the West with Richard Nixon's first visit to Beijing (1972), and the interview with an old and sick Mao in full revolutionary catharsis. A China with a gross domestic product which hardly exceeded \$100 billion, 2.7% of the world economy, far from the current 14.84%, and a per capita income of \$158, 2.3% of that of the US, 4% of Japan and 3.2% of Germany²⁹, while currently it is below the world average, but closer to that of the developed countries: 18.1% of the US figure, 25% of Japan and 23% of Germany.

Without a doubt, the sudden arrival of China as a great economic power, displacing the global geo-political centre towards the Far East, is the great geo-strategic challenge in the first half of the 21st Century. This shift of power, to which the growing economic and demographic importance of India, has three fundamental aspects, which have a significant effect on the future energy panorama:

- the Fukushima nuclear accident, which changes the traditional energy isolation of the other Asiatic giant, Japan;
- the renaissance in energy terms of the United States, which might become the largest world producer of oil and gas thanks to technological advances and a market system which has permitted unprecedented exploitation of unconventional oil and gas, which will allow it, in accordance with all forecasts, to reach 90 % self-sufficiency;
- and the phenomenon of climate change, a challenge of a truly universal nature, in which renewable energies and energy efficiency have an important role to play. Thus, now, the use of energy per unit of GDP is half of what it was in the 1970s.

But without a doubt, with the emergence of China, with its continental and maritime dominions like a new European Union in its infancy, in which the demographic factor is at the same time a heavy load and a formidable strength, the energy market is facing a world which is more dynamic and more strained. With growing demand, especially in the developing economies, the geo-political scene is experiencing an explosion of new local,

²⁹ http://es.kushnirs.org/macroeconomica/gdp/gdp_china.html Visited on 10th November 2013.

regional and global agents, new political alliances in various stages of progress, and a new ambit of interactions of supranational actors all indicators which know no frontiers, in which energy is the structural axis and the development-climate change factor is the most important challenge.

Thus, the market is getting more and more global, including the gas market thanks to the growing importance of LNG, and the institutions, such as the once all-powerful OPEC/OAPEC, which still has great influence, are multiplying and interacting with the important energy companies, both public and private, although all of them have a clear multinational character and with a more and more extensive and diverse business portfolio, both in the production and extraction sectors and in that of distribution and exploitation.

When we look to the future, China represents the new continental reality which feels hemmed in on its eastern maritime border due to the current hegemonic geo-political power, the United States. Its resurgence into the strategic panorama represents a gaze of hope, the Chinese dream, which needs to build new policies to effectively face the changing scenario which, inevitably and due to the new and different actors, will be more complex, difficult and dangerous.

In this situation, the challenge is formidable but the opportunities, if they are taken, may generate a framework of confidence, in which market forces act freely to establish a scenario of global development which will propitiate an atmosphere in which flexibility, adaptability, collaboration and prudence are the norm, and short-sightedness, with strident and inflexible conduct of a nationalist nature is the exception. A situation where new markets arise, mainly Asian but in which Latin America, Central Asia and Africa are getting more and more importance.

In this context, from the Chinese perspective, a profound reform of the current structure of global energy governance is considered necessary, with a complete review of the premises and the limitations of the possible political choices of the past. It is especially important, from the Chinese point of view, that the characteristics of the current multi-polar economic scenario, should be fulfilled with flexible and diversified objectives and, although it could not participate officially in the IEA, it should have the opportunity of intervening actively, together with other emerging powers, in all its activities so as to contribute to resolving the two fundamental challenges of that international governance, energy security and climate change.³⁰

³⁰ At the last ministerial meeting (2013) of the IEA held in Paris on 20th November, apart from the 28 member countries, the following also took part: South Africa, Brazil, China, India, Indonesia and Russia. For the first time, a joint statement was made public in which the mutual interest in achieving more intense and consolidated multilateral cooperation was expressed. There was also a separate statement, by the member countries, on the important role which the energy sector can play in limiting climate

This is especially true in areas such as: resource management and production; environmental regulation; industrial policies; critical infrastructures; taxation and subsidies; the size, disposal and management of strategic reserves; the exporting rules and restrictions; development of new technologies... But, in achieving a new framework of relationships, it is imperative to maintain the principles and objectives which contribute to preserving and improving a more integrated and legally secure global market, which promotes a more humane, secure and sustainable kind of development.

The change of energy paradigm. From the supply to the demand approach

"A broad range of other structural reforms will support the transition to more balanced and inclusive growth. Many of these, such as improved pricing of energy, land and water, are already proposed by the authorities. Allowing more competition in sectors currently considered strategic will boost growth and household income, and higher dividends from state-owned enterprises will improve financial discipline and provide additional fiscal revenue."³¹

When the energy scenario becomes more and more wide, global and interconnected, and therefore more stable, which does not mean more secure, as the joint American Chiefs of Staff reminded us, it does appear that there is a generalized consensus on the need to change the emphasis of the effort of policies at the state level. From the obsessive geo-political vision centered on guaranteeing the sources of supply, to a vigilant confidence that the market conditions may act in a free manner, so that: with the proper strategic reserves; the ever greater capacity of the diverse sources of supply to make production more flexible and modify the destination markets; and the variety of ways of generating energy; as well as its greater autonomy, these markets tend to act to maximize their value with greater efficiency, stability and security.

The paradigmatic example is oil, which, despite the continuous geo-political tensions on some of the most important exporting countries: Libya, Iraq, Iran, Nigeria, South Sudan, Yemen... with reductions in production of up to 3.5 million barrels a day, Saudi Arabia's capacity to balance the market, the growing importance of other supplying countries, as well as the sudden arrival of unconventional oil and the increase in refining

change. Chile and Estonia also took part in the meeting as aspiring members and over 30 leaders of companies from the sector. <http://www.iea.org/newsroomandevents/pressreleases/2013/november/name,44966,en.html>

³¹ "IMF Mission completes the 2013 Article IV Consultation Discussions with China", IMF, May 28, 2013. <http://www.imf.org/external/np/sec/pr/2013/pr13192.htm>.

capacity, ever closer to the production location, ensures the supply and maintains the price of the barrel in a stable band of \$80-120.

This price sustains a market with the capacity to invest in new forms of energy, making those new sources of energy viable and competitive which are currently rivals on the market, favoring the search for a new energy paradigm which must be focused on more efficient, clean and responsible demand. It is thus clear that oil, in all those sectors in which it enters into competition with other fuel types systems, loses ground.

In the search for this paradigmatic change, the IEA has launched a new publication which joins a series of traditional periodic market reports. The new installment: "*from hidden fuel to world's first fuel?*"³², on energy efficiency, shows us the evolution of the concept of energy security, stating that the first fuel, the most accessible and cleanest is the one that is not consumed.

The agency, which was created in 1974 by the OECD countries immediately after the 1973 oil embargo with the objective of opposing the disruptive policies of OPEC and guaranteeing the supply, has progressively changed the focus of its interests with a more and more global vision, integrating the three dimensions of the energy concept: the economy, its security and the environmental factor. At the same time it increases its area of interest towards those countries that do not belong to the OECD as they gain greater importance in consumption and supply.

China has maintained, for a long time a directed economic system, in which the energy management has been aimed at the sources of supply. The only objective of its authorities has been to guarantee an abundant supply of raw materials, while at the same time supporting economic development based fundamentally on the growth of its manufacturing industry and the reinforcement of its foreign trade. Energy efficiency and reduction in emissions were considered in a secondary place, when the most important task was growth. Thus, the improvement in per capita income was the fundamental objective of economic policy, taking advantage of the window of opportunity that the global market offered to its economy. But this leap forward, which has given rise to a grave socio-economic imbalance, is no longer seen as such but rather like a pathway that is opening up onto a horizon which is becoming more and more stable, which must now be balanced and consolidated.

However, the inertia of the situation tends to make the demand for energy consumption growing in an exponential manner. Even the policy of energy conservation and emissions reduction (ECER) is still not effective and lacks a system of implementation. Thus, the high growth in the consump-

³² From the unknown fuel to the world's first fuel? Translation by the author. IEA. Energy Efficiency Market Report 2013. "*Market Trends and Medium-Term Prospects.*"

tion of coal, oil and gas may, over the next few years, bring China face to face with a situation of external dependency, environmental degradation and increase in prices which will be difficult to manage.

The twelfth five-year plan opens up a period of strategic opportunity to modify the growth model³³. In order to achieve this, the indispensable element is to modify the energy demand management system from an obsessive fixation with guarantee of supply to a more balanced one where the efficient consumption becomes the great added value of its new development.

In this regard, it is necessary for internal reform for the organization of government, in which the National Energy Administration should fully exercise the functions of the regulatory organ of the system, with the category of Ministerial authority. In order to achieve this it should have as a subordinate organ the Department for the Conservation of Resources and Environmental Protection, currently part of the National Commission for Development and Reform. Also, in this role, it should control the Department of Conservation of Energy and Integral Application, currently attached to the Ministry of Industry and Technology. Thus, the new Ministry of Energy would be responsible for the whole of the energy sector in an comprehensive manner, giving it greater balance. In this way, the process of approval of large projects would be regularized while at the same time, improving transparency by means of a statistical and standardized information supply system.

This regularization should be established as well at the local level to achieve the detail of information necessary to permit the drawing up of more effective policies, as the assessment of the degree of implementation and the result of the policies. These policies should have efficiency objective in the use of energy, with clear goals of reduction of the energy intensity or, better, as the IEA report recommends, improving the index of energy productivity³⁴. Also, increasing the use of renewable energies, whit tax policies in covering the use of fossil fuels and incentives to favor clean energies, bearing in mind the specific characteristics of each region and province.

The strategic triangle of energy supply security

“Over the past thirty years, a remarkable continentalist transformation, as yet obviously incomplete, has begun quietly occurring in Eurasia. Open state-to-state warfare has largely ceased. Political barriers

³³ The new development programme approved on 14th March 2011 during the National Congress puts emphases on a high-quality growth.

³⁴ The energy productivity index aims to measure the number of units of GDP per unit of energy.

and historical antagonisms have been eroding, especially since the end of the Cold War, among such diverse nations as Russia, Turkey, China, and Korea. Transcontinental trade, driven by energy interdependence, has intensified, and interpersonal networks have depended. Most recently, a transcontinental oil and gas pipeline network has begun to emerge, with potentially significant geopolitical implications... With the coming of transcontinental pipeline, security dialogues, and summit conferences, the way is opening for more geopolitically significant collaborations as well, contrasting sharply with the mutual isolation of the Cold War past,"³⁵

The change of energy paradigm, from the supply approach to that of demand, rests on a structure which favors and supports an energy security scheme, which is at one and the same time global, regional and local. The current objective for the Chinese authorities is to consolidate and stabilize an energy supply which does not endanger the maintenance of sustainable growth of 7%³⁶. At the same time, it must permit the establishment of the conditions for the new development phase, more centered on social benefit than on economic one and which, therefore, must change dramatically the energy scenario.

One of the essential elements refers to a new international governance characterized by multi-polarity and the diversification of objectives, which establishes a new balance of power, in such a manner that no institution has a dominant position. Thus, the traditional influence and structures such as the IEA and OPEC, are being challenged by consumer countries and other producers. The International Energy Forum³⁷ is the only international organization which nominally includes both the advanced countries and developing ones³⁸, but its statistical information comes from six organizations: APEC³⁹, Eurostat, IEA, OLADE⁴⁰, OPEC and UNSD⁴¹. Furthermore, its scope of action is limited and well below the level of influence of the IEA, and even of the EIA. And, while multi-lateral cooperation is becoming more and more necessary, with China becoming more and more comfortable in these forums, bilateral cooperation will be the fundamental fulcrum on which international cooperation turns in practice.

³⁵ CALDER Kent E. *"The New Continentalism. Energy and Twenty-First-Century Eurasian Geopolitics."* (2012). New Haven and London. Yale University Press. Page xxix.

³⁶ The eleventh five-year plan established an objective of growth of 7.5%, while the real growth rate was 11%. In relation to the current plan, the analyses of the international organisations forecast growth which may exceed 8%.

³⁷ <http://www.ief.org/>

³⁸ 89 countries from six continents which offer 90% of the supply, and the demand for oil and gas, with a vision, global energy security through dialogue.

³⁹ APEC (Asia Pacific Economic Cooperation)

⁴⁰ OLADE (Organización Latinoamericana de Energía)

⁴¹ UNSD (United Nations Statistic Division)

From the Chinese point of view⁴², the importing countries should reduce their rate of growth in consumption with active policies which encourage efficiency and diversification, with special emphasis on clean energy sources. In relation to the market, it shows concern with what it considers to be a growing nationalism which limits the increase in investments and the internationalization of the market, which would favor the adoption and use of advanced technologies and a greater expansion of security. At the same time, China views with concern the social instability of some producing countries as well as the tendency towards the renationalization of the energy business in many countries. It also considers that the market linked to the North American currency and the regulation of trade in basic products, represented by oil, is controlled by the developed countries. The leadership of these countries and the cooperation with emerging countries would reinforce their control and regulation, avoiding the excessive financial attribute of oil which distorts the balance of the market and its price.

The central axis of China's geo-strategic vision resides in the need to maintain the security framework and international stability, which has favored the policy of growth based on a clear commitment to opening up to the external market. In this regard, China insists on two of the main principles of its external action, respect for national sovereignty and the use of dialogue to resolve differences and conflicts. Thus, it considers the existence of military alliances and the hegemonic postures of a regional nature to be prejudicial while, at the same time it advocates greater cooperation against terrorism and piracy, which allows the securitization of critical energy infrastructures as well as transport routes. In short, it considers that the international community has the obligation to create a secure geo-political framework for the global energy market.

The geographical scenario. The Chinese model of relations

"Energy and mineral resource exploitation is the major impetus for the economic booms of many African countries. In this area, Chinese enterprises have helped African countries establish an upstream-downstream-integrated industry chain, transforming resource advantages into economic growth opportunities, and actively participated in local public welfare infrastructure construction."⁴³

⁴² Energy Research Institute (ERI), National Development and Reform Commission. China Energy Outlook. Executive Summary. "Recommendation 9: The international community should establish a legal framework for the energy market and thus guarantee global energy security." Author's translation.

⁴³ White Paper. "China-Africa economic and trade cooperation". (August 2013). State Council. The People's Republic of China.

China's continental scenario and its openness to world trade through its maritime provinces establishing a framework like the European one which would allow it to occupy a highly-favorable geo-strategic position.

However, this privileged position is limited by the presence of the geopolitical Maritime Domain⁴⁴ which, together with the military power of the United States and its close links with Japan, South Korea, the Philippines and the special relationship with Taiwan, imposes a series of conditioning factors on its geographical scenario.

The Chinese model of relationship has its fundamental principles rooted in a historical and cultural tradition which is very difficult to modify, as is clearly established in the preamble to its Constitution:

*"The future of China is closely linked to the future of the world. China systematically maintains an independent foreign policy which adheres to the five principles of: mutual respect for sovereignty and territorial integrity; no bilateral aggression; no interference in the internal affairs of other countries; reciprocal equality and benefit; and peaceful co-existence... China is radically opposed to imperialism, colonialism and hegemony..."*⁴⁵

Thus, non-interference and non conditionality are characteristics which do not look as if they will be modified in the near future although current scholar about concerns the concept of "intervention", as an obligation of a moral, strategic and economic nature very much related to in its new status as a global power, in contrast to the concept of "interference", which is opposed to Chinese sentiment.

To this governmental relationship policy, others form of superimposed levels must be added; the first refers to the main state companies, which share all the characteristics of multinational companies, although with the added advantage of State support and the excellent China's political relationships; and the second level, interconnected with a pleyade of medium-sized and small companies outside government control although, they often have the support of the provincial authorities, as well as, the multiplicity of small traders who compete directly with local businesses.

⁴⁴ The three strategic domains, according to the work of COHEN, Saul Bernard. *Geopolitics: the geography of international relations.* Second edition (2009). Maryland, Rowman & Littlefield Publishers, Inc., are: "East Asia, which is dominated by China and includes North Korea, and a separate geo-political region, Indochina, which includes Vietnam, Laos and Cambodia; the Euro-Asian Continental Area... dominated by Russia... running like the interior of a half-moon from the Baltic, through Eastern Europe and the Black Sea, Central Asia and Mongolia, as far as the Korean peninsula; and the Maritime Domain, depending on commerce in the Atlantic and Pacific Oceans... dominated by the United States." Author's translation.

⁴⁵ Preamble to the Constitution of the People's Republic of China. 14th March 2004. Author's translation.

Another two fundamental characteristics of these relations refer to the capacity to establish integral, agreements, which incorporate aspects which only the support of the central authorities can guarantee. Among these elements are large credits for important infrastructure projects⁴⁶.

***The rationalization of the means of supply.
The political commitment***

"In Europe, despite the advances which have arisen from the strategic reflection of the Green Paper from the year 2000 (Towards a European strategy of security of energy supply), a common policy is still absent, and what there is of, it is guided by the interests and influence of the two main continental economies. The nucleus was the analysis of two very concrete points: the challenges for the security of supply and the potential weaknesses. The main risks were organized in four categories: physical risks (exhaustion of resources: North Sea oil or gas), economic risks (volatility of prices or price rises without any possibility of control), social risks (those deriving from shortages, above all of fuels) and ecological risks."⁴⁷

China presents on the global scenario, and more exactly on the Asia-Pacific scenario, a geo-political factor which is similar to that exercised by the European Union internationally and in its natural Euro-Atlantic scenario. But in the case of China, with strengths and weakness which make it different with regard to the European model.

Thus, China has a multinational reality, like the European one, and with a system of provincial authorities which enjoy wide autonomy. However, the capacity to legislate throughout the territory, with a political model of funipe party which as strongly hierarchical structure at all levels of administration, facilitates the ability to regulate the market, and the possibility of establishing a strategic vision and long-term programming.

Although, the absence of formal democracy imposes on its authorities the need to continually question themselves about their own legitimacy based on three fundamental premises: revolutionary credit, the moral superiority of the party and economic results; in a scenario which is challenged by a reality of, still, 180 million poor, on a halo of corruption and nepotism which is of special importance in the rich energy sector, as well as the social inequalities and the implacable

⁴⁶ One symbolic project is the new headquarters of the African Union in Addis Ababa, Ethiopia, with an estimated cost of approximately \$200M.

⁴⁷ MARÍN, Miguel et al, *"Propuestas para una estrategia energética nacional. Edición 2013"*, 2013, Madrid, FAES: Foundation for analysis and social studies.

deterioration of the environment. In this regard, the rationalization of energy supply is indispensable due to the physical, economic, social and ecological risks.

Coal

The use of coal, of which China has the world's third largest reserves, at 13%, behind the United States and Russia, as the main source of energy faces two fundamental challenges: the intensive use of its reserves⁴⁸ which will lead, in the long term, to the loss of its pre-eminent position on the international ranking (figure 5.5); and the growing demand for energy from the south-east of the country, which is developed and industrial, more and more diametrically opposed to the main sources of production,⁴⁹ which are located in the north-west, which is poor and de-industrialized.

The challenge of its transport, both by road, amounting to 10% of the world road traffic, and by sea, which represents a similar figure to all the international maritime coal trade. With another consideration, while the maritime transport of coal is highly efficient and its cost is very low thanks to the large fleet of over 200.000 dry cargo ships operating internationally, continental transport is highly onerous, not only as a result of the high price of gasoline but also due to the contamination and traffic jam of the roads. This internal transport, whether by road or by rail, due to its intensity, has some very critical social implications⁵⁰.

Thus, China, which has typically been a coal exporting country, has become a net importer, with over 200 million tons in 2011, 18% more than in 2010, through its significant ports in the south-east, coming from the rich deposits of Indonesia and Australia. In this regard, it is planned to reach 50% of the total consumption by the free international market at some very competitive prices and in a totally globalized and stable scenario as the best way of rationalizing its supply.

⁴⁸ "Coal production rose 9 per cent from 3.5 billion short tons in 2010 to over 3.8 billion short tons in 2011, making China the largest coal producer in the world." EIA. Country Report. China.

⁴⁹ In China, there are 27 coal-producing provinces, of which the leading one was Shanxi, close to Beijing, but which is reaching its limit of exploitation, with the most important mines currently being located in the autonomous regions of Inner Mongolia and Xinjiang Uigur.

⁵⁰ In order to have an index of magnitudes: "The cost of transport of one tone by land is 7 times more expensive than by sea, a proportion which is multiplied by 10, i.e. seventy times dearer, if it is by air". Speech by the Spanish Chief Naval Operations at CESEDEN on 4th November 2013.

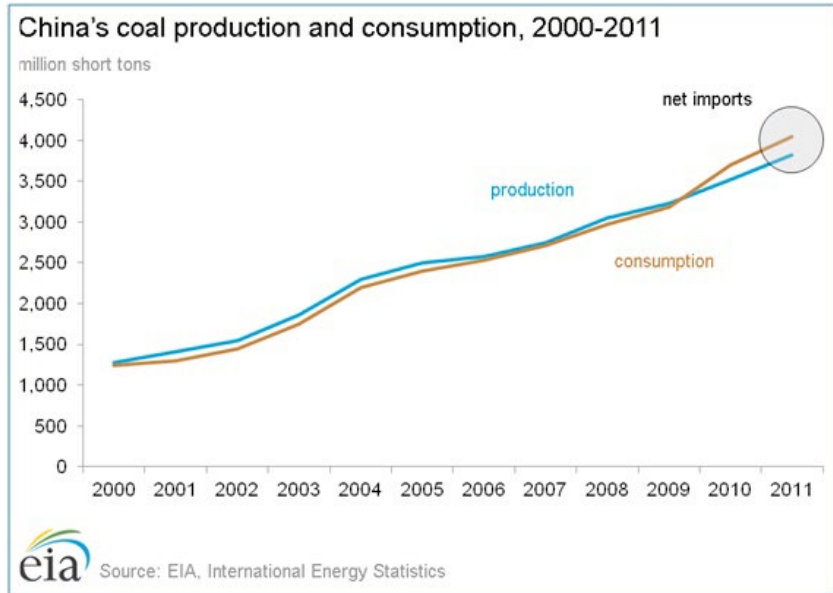


Figure 5.5

Oil

After experiencing annual growth of 7%, achieving a maximum of 4.3 Mbd in 2010, production has stagnated while oil companies are making an effort to increase production at sea to 15% and also to improve the use of new techniques (EOR, Enhanced Oil Recovery) so, to lengthen the lifetime of the production areas, as well as prospecting in new reserves in the north-west, in Xinjiang, Sichuan, Gansu and Inner Mongolia.

The increase in dependence on imports (see figure 5.6) makes it necessary to rationalize the supply and to develop technologies for the production of unconventional oil and to extend the useful lifetime of its oilfields⁵¹. One of the fundamental elements in order to achieve these objectives is investment by Chinese companies in international projects and the formation of strategic associations with international companies. In a scenario of economic crisis, China is using its important currency reserves, estimated at over 3,660 trillion dollars⁵², for the purchase of and taking

⁵¹ "EIA expects China to import about 75 percent of its crude oil by 2035 as demand is expected to grow faster than domestic crude supply". EIA. Country Report. China

⁵² "The People's Bank of China said the country does not benefit any more from increases in its foreign-currency holdings, adding to signs policy makers will rein in dollar purchases that limit the yuan's appreciation... China's foreign-exchange reserves surged \$166 billion in the third quarter to a record \$3.66 trillion, more than triple those of any other country and bigger than the gross domestic product of Germany, Europe's largest economy." <http://>

stockholdings in foreign companies in all continents except Europe, investing over 18 billion dollars in the oil and gas sector, of which 12 billion dollars were aimed at achieving greater access to LNG and unconventional gas. Thus, foreign production of oil with Chinese capital has grown significantly during the last decade from 140,000 Bld in 2000 to 1.5 Mbd in 2011⁵³.

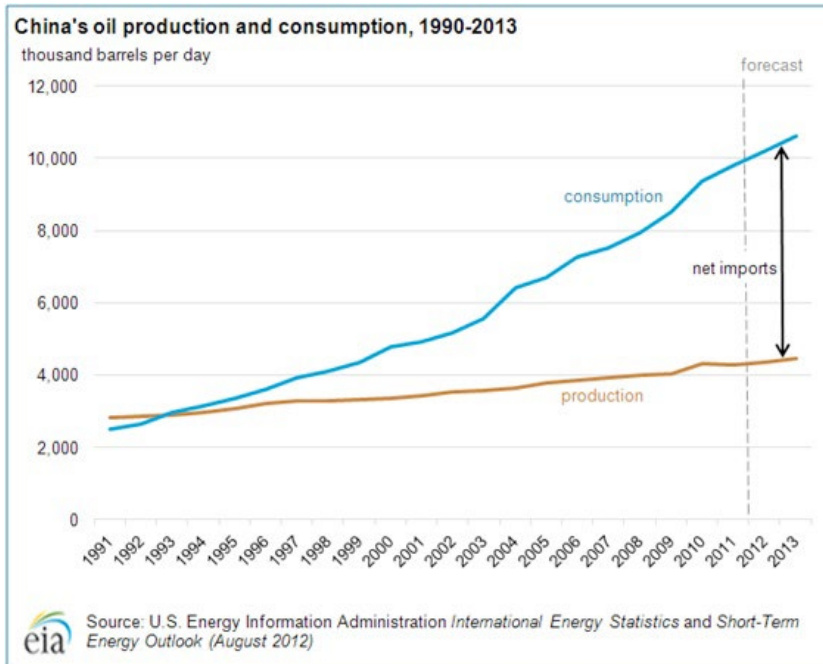


Figure 5.6

The Middle East is China's main source of crude (see figure 5.7), although with the objective of distributing and ensuring supply as far as possible, African countries and especially Angola are increasing their share. An interesting case is Sudan and South Sudan, one of its main suppliers of crude, and also target for of large infrastructure investments, whose continuing instability does not guarantee the important supply from the storage tanks that are the property of the CNPC (China National Petroleum

www.bloomberg.com/news/2013-11-20/pboc-says-no-longer-in-china-s-favor-to-boost-record-reserves.html

⁵³ "Since 2008, Chinese NOCs have secured bilateral oil-for-loan deals amounting to roughly \$100 billion with several countries in order to obtain hydrocarbon resources and mitigate lending risks with suppliers. China finalized oil-for-loan deals with Russia, Kazakhstan, Venezuela, Brazil, Ecuador, Bolivia, Angola, and Ghana - and a gas-for-loan agreement with Turkmenistan. Venezuela and China have signed oil-for-loan deals, including \$32 billion in exchange for 430,000 bbl/d of crude oil and products." EIA. *Country Report. China*

Corporation). Another case that test the flexibility of Chinese supply were the disputes between Sinopec, the main Chinese importing company and the Iranian state company, which led to a loss of 34% of its market share during the first quarter of 2012.

The main fulcrums which enable China to absorb the market imbalances are the countries of the Middle East, mainly Saudi Arabia, together with Venezuela, Russia and Angola. However, China will continue to make its sources of imports more flexible, so as to reduce the risk of interruptions in a geo-political panorama, which is a polyhedric structure whit many sides that could generate sharp edges and which stands out for its complexity, uncertainty and potential danger.

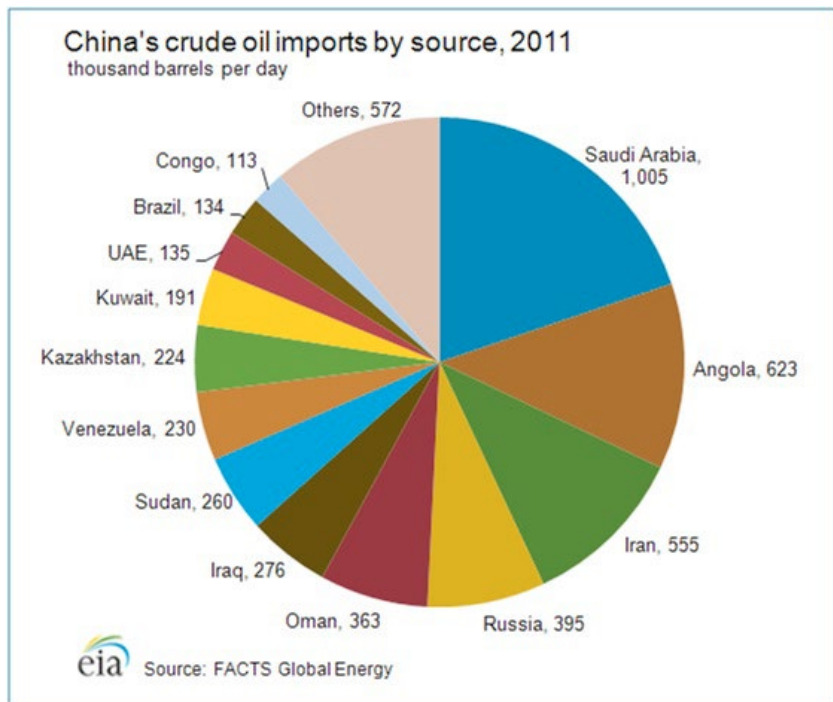


Figure 5.7

Another fundamental element in the rationalization of the means of supply is the improvement in the integration of the national network of oil and gas pipelines as well as the diversification of the network of international connections with neighboring countries to increase the oil supply routes. The over 20,500 kilometers of oil pipelines in the national network and the almost 13,300 kilometers of the local network should constitute a fundamental tool for social integration although, for the moment, they serve mainly the most industrialized provinces of the Eastern coast and the north-east region, close to Beijing. However, a number of routes un-

der construction aim to join together the new areas of supply and the refining facilities, as well as, in the opposite direction, the most distant markets. In the new five-year plan, up to 2015, it is planned to build over 10,000 kilometers of pipes for crude and another 10,000 kilometers for refined products.

China inaugurated its first transnational oil pipeline in May 2006, when it began to receive Russian and Kazakh oil from Atasu, in the north of Kazakhstan, to Alashankou on the Chinese frontier. This first oil pipeline has been extended towards the west until it reaches the oilfields of the Caspian Sea, while at the same time its capacity has been doubled, and is expected to reach 400,000 Bld in 2014.

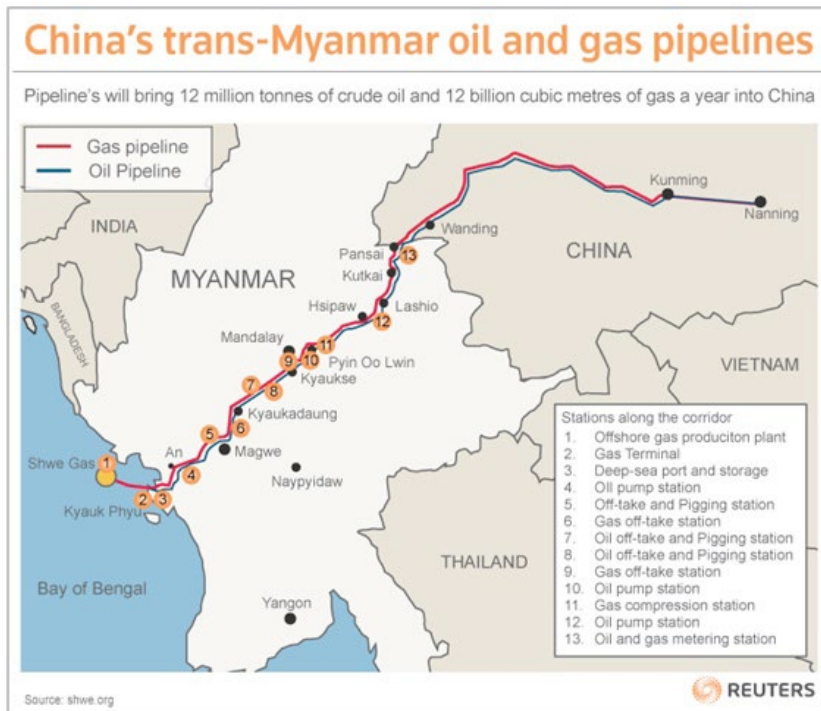


Figure 5.8

The second international oil pipeline is a branch of the ESPO (Eastern Siberian-Pacific Ocean), which aims to connect the Russian city of Taishet with the Pacific coast, at a distance of some 5,000Km. The branch of some 1,000 Km. built by CNPC joins the oil pipeline with the Daqing oilfield in northeast China.

The third international connection will joint the Bay of Bengal with the province of Guangdong, in southwest China. It will be an oil pipeline (see figure 5.8) designed to transport 22 million tons of crude, which will most-

ly run together with the gas pipeline completed in October 2013. The oil pipeline, bearing in mind the absence of oil production in Myanmar, will serve fundamentally to supply oil from Arab countries without needing to go through the Malacca Straits.

Finally, in the country's interior, the 1,850 Km. oil pipeline for refined and crude which connects the Urumqi refinery in the province of Xinjiang with Lanzhou in the province of Gansu will be progressively extended with regional branches such as Lanzhou-Chengdu-Chongqing and Lanzhou-Zhengzhou-Changsha, until it reaches the coastal regions.

Natural gas

Although the use of natural gas is growing rapidly, it still stands at around 5% of total consumption of primary energies and, with an increase of up to 10% in 2020, it appears to be the great challenge in order to alleviate the tremendous environmental problems caused by the massive use of coal. Furthermore, it has to constitute a fundamental element for the diversification of supply sources for final users above all in the case of the north with over 500 million inhabitants, where the need for heating is one of the key elements in coal consumption.

Despite having the second largest reserves of conventional gas in the Asia-Pacific region, and the world's largest reserves, according to EIA estimates, of technically-recoverable unconventional gas, China is aiming to rationalize its sources of supply from the areas where the main reserves are.

Consumption increased by almost 50% in 2011, with over 1 Bcf being imported by means of LNG and oil pipelines (see figure 5.9). Although the majority of gas consumption is in the industrial sector, 34% in 2011, its use is being extended more and more in the service and residential sectors, while for electricity generation nuclear or hydraulic energy is preferred. These last, furthermore, as they are large-scale and magnificent, offer a great opportunity for Party propaganda with the purpose of boosting the legitimacy and the authority of the politburo.

The EIA forecasts that gas needs will triple by 2035, growing at a rate of 5% per year. In order to satisfy this demand, China will continue to place its trust in the import of liquefied gas and a trident of oil pipelines which give it great geo-strategic flexibility: from the Russian Federation, with the immense reserves of Siberian gas: the re-baptized new silk route from the Caspian Sea; and the Bay of Bengal as the natural escape route which allows China to avoid the blockade of the first and second island chains⁵⁴.

⁵⁴ "... the situation for China, at the beginning of a phase of maritime and naval expansion, is very similar to that which existed almost throughout the 20th Century at the opposite end of Eurasia, a continental power which is trying to become a great naval power, surrounded

Also, in order to bring natural gas closer to its final user, above all in its use in the domestic area, it needs to increase its strategic reserves and to establish a gigantic internal network for its distribution and storage at local level⁵⁵. With nearly 50.000 kilometers of oil pipelines and with electricity companies increasing their connections at the local, provincial and state level, the government intends to increase the main arteries for the flow of natural gas by another 40.000Km in 2015, while an attempt is made to achieve the integration of the distribution network, which is currently controlled by different companies.

That network should be fed, apart from by the local production of gas, by a wide-ranging and well studied system of supply lines in order to avoid the problems which Europe had until recently in its supply as a large part of its territory depended on a single supplier and a single supply line. Thus, in 2006, CNPC signed a MoU (Memorandum of Understanding) with Gazprom to open up two points of access to Russian gas, one in the north-west to receive the gas from the Kovysta reserve in 2015 and another in the northeast from the Sakhalin Islands. The agreement has not been acted upon due to the lack of agreement over the price of the gas.

As the back bone of the new silk road⁵⁶, the CAGP (Central Asia Gas Pipeline) runs for 20.000Km. The first Chinese oil pipeline, in operation since December 2009, for the import of natural gas from Turkmenistan (South

by naval powers, in this case Japan and Korea, which in turn are supported by the American naval colossus.

The first challenge is the defence of the coastal regions, a problem which has been complicated because of Taiwan, which is located at a distance of about 100 miles off the province of Fujian and which divides China's maritime front in two interrupting naval movements between the north and the south. Furthermore, Taiwan forms part of the succession of islands which runs from the Philippines in the south to the Japanese archipelago in the north, which Chinese naval strategists call the "first chain of islands" and which includes the waters surrounding China, its "maritime buffer", thus permitting the country that controls it to contain Chinese naval activities and to impede its maritime commerce...The final stage in the evolution of Chinese naval thinking commenced less than a decade ago and led to a [Navy] with oceanic capacity to operate in the Western Pacific and the Indian Ocean, projecting its naval power in support of Beijing's international policy and in order to protect sea traffic in both oceans. This new strategic conception, adopted at the highest level, also establishes the need to control the waters to the west of the so-called "second chain of islands", which runs from Japan towards the south-east, including the Marianas and Guam and continuing towards the south as far as New Guinea." MACKINLAY FERREIRÓS, Alejandro. IEEE. Opinion document 06/2011.

⁵⁵ "China lacks gas storage capacity, causing it to consume almost all of the gas it supplies. The government intends to increase storage capacity from nearly 70 Bcf to 1,100 Bcf in 2015." EIA. Country Report. China

⁵⁶ "On the occasion of the G-20 meeting in Saint Petersburg, on 7th September 2013, the Chinese President visited four Central Asian countries proposing, at Nazarbayev University in Astana, closer cooperation between China and Central Asia to build an economic belt around the "Silk Road" to join the Pacific with the Baltic Sea and so as to promote a market of over 3,000 million people with an unprecedented potential." Quoted by GARCIA SAN-

Yolotan), Uzbekistan and Kazakhstan. At the same time, the Chinese companies are increasing their investments in the region to help the development and exploitation of its important reserves.

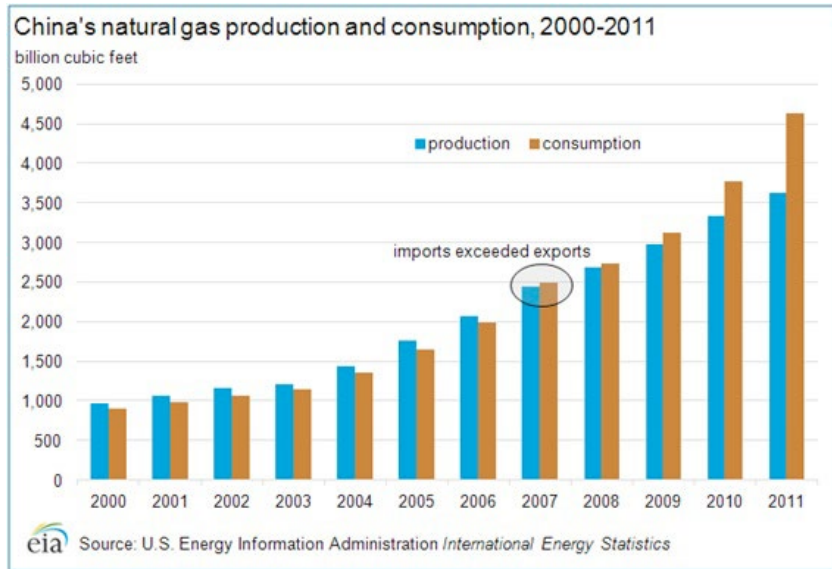


Figure 5.9

The third prong of the Chinese continental supply trident opens onto the Indian Ocean through the Bay of Bengal and is aimed at the Indian colossus. This important artery for energy supply⁵⁷ forms part of the ambitious “Shwe Project”, which consists of the exploitation of the natural gas deposits of the Bay of Bengal and joins the port of Kyaukpyu with the south-western provinces of China, Yunnan, Huizhou and Guangxi, which up to now have depended on the liquefied gas from the province of Sichuan, which had reduced its economic and industrial development. The construction, the result of the collaboration between the CNPC, Myanmar Oil and Gas Enterprise (MOGE), Daewoo International Corp, Korea Gas Corp, Oil India Ltd and GAIL India Ltd, runs for over 2,500Km of which almost 800 are on Burmese territory. Furthermore, it allows the Chinese state to boost its presence in that country, which is continuing its opening to the west since the bloody repression of September 2007, the controversial action of the government after the passage of the Nargis Cyclone and the elections of April 2012. A country with a per capita income of

CHEZ, Ignacio in the Geo-Political Panorama of Conflict 2013. Chapter XII. *The Chinese inner ring. A factor of strength or weakness?* IEEE.

⁵⁷ HIDALGO GARCÍA, María del Mar. *La finalización del gaseoducto Myanmar-China*. Visited on 22.11.13 <http://www.ieee.es/contenido/noticias/2013/11/DIEEEI28-2013.html>

\$1,200 which views with concern, due to the environmental impact, some of China's large projects, such as the great Myitsone Dam, one of the several hydraulic projects planned on the main aquatic artery of the country, the Irrawaddy River, of great commercial importance. The \$3.6B project was suspended in 2011 due to the public pressure as a result of the relocation of some 15.000 inhabitants of the region to be flooded, which would occupy an area similar to that of Singapore and of when the main beneficiary would be the Chinese province of Yunnan, which would receive 90% of electrical production, despite the fact that three quarters of myanmar do not have access to electricity.

But half the imports of natural gas reach the more industrialized areas of the China directly via the port terminals for LNG (figure 5.10)⁵⁸. The capacity in mid-2012 was of 1.000 Mcf, while another 2.000 Mcf are planned by 2015. It is foreseeable that this trend will continue in the medium term although the price on the Asiatic market is five times greater than the gas price in the USA and almost double that of the European market⁵⁹ and, of course, higher than that which is produced domestically and that imported using the continental gas pipelines. However, this is considered to be one of the main routes to ensure this vital geostrategic flow. In this regard, one of the latest reports of the IEA⁶⁰ dealt with the matter of supply of LNG in the Asian market highlighted of a large distribution center which might be located ideally in Shanghai, although significant reforms would be necessary to the financial system⁶¹, or in Singapore, to satisfy a region which, with Japan and Taiwan depending, fundamentally on this supply.⁶²

Currently, LNG reaches the country through five terminals belonging to the powerful CNOOC and CNPC, with another four under construction and

⁵⁸ IEA report: "Gas Pricing and Regulation, China's challenges and IEA experiences." 11 September 2012

⁵⁹ Approximate prices in 2012: Asia \$15Mbtu, Europe \$8Mbtu and USA \$3Mbtu. Coal \$4Mbtu.

⁶⁰ IEA report: "Developing a Natural Gas Trading Hub in Asia. Obstacles and Opportunities" February 2013

⁶¹ "China this Sunday took a new historic step in opening up its economic and financial system to the world with the official start of the Shanghai new free trade zone, an experimental area which is destined to be a revolutionary player in the international economy." http://economia.elpais.com/economia/2013/09/29/actualidad/1380468089_303040.html

⁶² *Ibidem*, page 23. "The two most mature natural gas markets in the Asia-Pacific region are Japan and Chinese Taipei; coincidentally, both markets are nearly exclusively supplied by LNG, as local production is practically non-existent. In 2011, these two mature markets consumed 87% of all LNG delivered into Asia. A marked shift in demand for LNG is expected, as mature markets such as Japan have limited potential for an increase in LNG demand, while demand growth in China (275%) and India (72%) is likely to be considerable."

several more which are awaiting government approval⁶³. The companies must ensure the supply before building a gasification terminal and must also compete with foreign companies, especially those of Korea and Japan. Thus CNOOC, PetroChina and Sinopec have signed contracts with other companies from Indonesia, Malaysia and Australia. QatarGas too has entered the Chinese market.



Figure 5.10

The diversification of energy basin sources. A promising future

“Energy is of vital importance to economic development and people’s well-being. In order to reduce conflicts and inequality brought about over access to energy resources, achieve a stable growth of the world economy and make the economic globalization lead to a balanced, universally beneficial and win-win development, the international com-

⁶³ “Several re-gasification terminals are in various phases of planning and construction. CNOOC is keenly interested in growing its LNG market as it has a competitive advantage thus far in the sector compared to the other NOCs. In addition, CNOOC is constructing 3 plants - Zhuhai, Zhejiang, and Hainan - and intends to expand the company’s three existing terminals. PetroChina/CNPC recently entered the LNG market and commissioned its first two re-gasification terminals, Dalian and Jiangsu, in 2011 and is building the Tangshan terminal. Sinopec anticipates entering China’s LNG market by 2014 with its Qingdao terminal.” EIA. Country’s report. China

munity should foster a new energy security concept featuring mutually beneficial cooperation, diversified development and common energy security through coordination. To jointly ensure global energy security, the Chinese government calls for international efforts in the following three aspects:

- *Strengthening dialogues and exchanges*
- *Carrying out effective energy cooperation*
- *Working together to maintain energy security*⁶⁴

There are two factors which are pushing the development of new energy sources and greater investment, not only in the search for alternative methods, but also in the exploitation of the resources in the contraction phase in a more efficient manner, such as in the use of fossil fuels held in a range of geological formations. These two factors are without a doubt: the price of oil and the high level of contamination from coal.

The price of oil will remain stable, according to most analysts, within a band that the market considers reasonable, of between \$80 and \$120 a barrel. This price, which should tend downwards due to increased production, both conventional and unconventional, and the improvement in the distribution, integration and level of market reserves, and which, in the opposite sense, would be shaken by the growing geo-political uncertainty, tends to show a great structural strength which makes it possible to guarantee its stability in the medium and long term. This firmness in the level of prices makes possible, both in public and private terms, investments in new sources which are taking on ever greater market share in all sectors except transport where it will continue, for a long time to come, to be the dominant energy source.

At the same time, coal, which displaced biomass to become the driving force behind the industrial revolution at the beginning of the last century, and which lost its leading position as the primary energy source in the middle of the same century, has again become the platform on which the new industrial revolution of the developing countries is based with a clearly global character.⁶⁵ The paradigm is China, which, with its amazing economic development serves as a guide, not only for emerging countries but also for the new political⁶⁶ and economic awakening of the youngest

⁶⁴ White Paper: "China's Energy Policy 2012". October 2012, Beijing. State Council

⁶⁵ "In 1957 the demand for petrol exceeded that for coal. Currently, with a growth rate of 2.65% compared with 1.2% for oil, coal could again exceed oil in 2020. Over 90% of coal production is extracted domestically in China, which produces more energy than all the oil in the Middle East." Extracts from the presentation: "Medium Term Outlook for Coal." by Laszlo Varo, IEA, December 2012.

⁶⁶ "The ongoing dispersal of global power is furthered by the emergence of a volatile phenomenon: the worldwide political awakening of populations until recently politically passive

societies and countries on the planet. Coal, abundant and very widely distributed, with a global, stable and perfectly integrated market, is struggling against “*the evidence of climate change*”⁶⁷. In this discussion, China hoists the flag of the necessary differentiation between countries which depend on their specific characteristics and their degree of development. But at the same time it is preparing to play the new status of geopolitical power.

This is shown by the tremendous effort, without endangering the continuing economic progress, to achieve sustainable development, by means of the maximum diversification of energy sources, giving incentives for their use, for which a pilot experiment was started last June for trade in carbon emission rights (ETS, Emission Trading System) in Shenzhen, and which has now been extended to a total of seven cities: Shenzhen, Guangdong, Hubei, Beijing, Shanghai, Tianjin and Chongqing.

The effort for diversification of the sources of energy is a prior condition to the development of the economy with less energy intensity, and a reduced rate of greenhouse gas emissions. Apart from the logical evolution of the developed economies towards sectors of less energy intensity, such as services and technology; thus, China expects progressive changes in energy consumption, in such a manner that it becomes more and more efficient and with low-carbon sources taking precedence. It is in the industrial sector that a greater effort is expected, with the progressive displacement of coal by natural gas⁶⁸, above all in industries associated with the rapid real estate growth, especially the cement and metallurgical industries. Meanwhile, in the electricity sector, the effort will be directed towards boosting nuclear, hydraulic and renewable energies, among which wind and solar energies will be the most important, without forgetting other sources such as biomass, solid wastes and geo-thermal energy⁶⁹. In relation to hydraulic energy, China plans to use the natural possibilities as much as possible, while recognizing that there is a com-

or repressed... The world is now almost everywhere politically awakened—with millions stirring restlessly in pursuit of a better future... The younger generation of today is particularly responsive to political awakening because the Internet and cellular phones liberate these young adults... BRZEZINSKI, Zbigniew. “*Strategic Vision: America and the Crisis of Global Power*.” (2012) New York. Basic Books

⁶⁷ GARCÍA SÁNCHEZ, Ignacio. “5º informe del IPCC. La certeza de una herencia. El calentamiento global”. 1st October 2013. www.ieee.es

⁶⁸ IEA WEO2013: “*Market conditions vary greatly between the different regions of the world but the flexibility and environmental advantages of natural gas in comparison with other fossil fuels put it in a position to prosper in the long term. The increase will be greatest in the emerging markets, notably in China, where the use of gas will have quadrupled by 2035...*”

⁶⁹ *Ibid*: “*Renewable energies represent almost half the increase in world electricity generation up to 2035, and variable sources—wind and photovoltaic solar energy—constitute up to 45% of the expansion in renewables. China will record the greatest absolute increase in*

ponent of variability, as with solar and wind, which depend on climatic conditions. In this regard, in 2011 there was a notable reduction in electricity production due to the significant drought suffered by the country⁷⁰. However, on the other hand, the predictability of the prices of these clean energy sources is an advantage in contrast with the volatility of the price of fossil fuels.

Another two fundamental aspects which are of great importance as they are undergoing growth in parallel to economic progress, the more so if we bear in mind the geographical characteristics and the physical dimensions of the Chinese state, are: the consumption of energy by road transportation⁷¹ (see figure 5.11a) and the use of heating and air-conditioning in the urban environment. The use of bio-fuels, hydrogen, gas... and the final objective of the electric car, or hybrids, is one of the seven priorities of the twelfth five-year plan. While the natural gas sector enjoys intensive growth⁷², the objective is to extend its infrastructure at the same rate as demand so it will be necessary to make significant reforms in a sector dominated by CNPC, which is excessively rigid and vertically integrated without separation between transport and commercial activities.

generation from renewable energies; it will be greater than that of the European Union, the United States and Japan together".

⁷⁰ *"The abnormally hot weather and severe drought in Central and South China has affected hydropower production and may lead to a severe power shortage this summer. In East China's Anhui province, the power shortage is expected to reach as much as 25 million kilowatts at peak hours this summer, partly caused by low water levels for hydropower, said an industry insider."* Visited on 16th November 2013. http://www.china.org.cn/environment/2011-05/25/content_22635822.htm

"China which relies on coal to produce more than 70 percent of its electricity, may increase imports of the fuel by 1 million metric tons a week as drought conditions cut hydropower output... Hydropower capacity has fallen as much as 20 percent... The world's biggest energy user may face power shortages of 30 gigawatts during the summer as supply lags behind demand." Visited on 16th November 2013. <http://www.bloomberg.com/news/2011-05-05/china-coal-imports-may-rise-as-drought-saps-hydropower-ubs-says.html>

⁷¹ *"Car, truck and bus sales in China continue to soar and are expected to reach 20 million units this year. The US, the world's traditionally largest auto-market, expects vehicle sales to reach 16 million units in 2014. Given the huge size of the Chinese population and the low levels of car ownership today, it is evident that in the vehicle sector China will not reach saturation levels for years to come. The current rate of Chinese car ownership stands at 70 cars per 1,000 people and it is estimated that will take more than 20 years to reach 400 units per 1,000, a mark considered an upper level for the Chinese society."* <http://www.cgcs.co.uk/news/1023-chinas-oil-demand-to-2020> Visited on 10th November 2013

⁷² In 1990, the Chinese gas market was practically non-existent. Since 2000, it has increased in size five times, becoming the fourth largest market in the world, with an estimated growth, according to the IEA, of 13% annually over the next five years. The Chinese authorities want consumption to double by 2017, which seems an excessively ambitious goal.

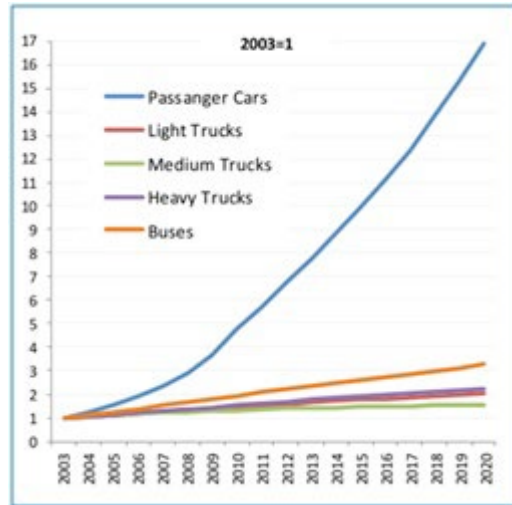


Figure 5.11a

Another fundamental element is the integration of the different sources of supply when we refer to the production of electricity. In this regard, the effort to develop intelligent networks to integrate and distribute electricity generation from diverse and complex sources into a single network is directed by the SGCC (State Grid Corporation of China). Thus, in one of its most recent provisions it limited the generation of electricity by private citizens and companies to six megawatts. Currently, the NEA (National Energy Administration) is carrying out demonstrations across the country of intelligent networks integrated in special areas of economic development, to encourage the private sector to invest in an industry which can generate a market value of \$1,600T, and create business opportunities in an indirect manner which will triple the previous figure. Also, and in line with what is occurring in the United States, above all in the State of California⁷³, the NDRC (National Development and Reform Commission) is insisting that the operators take the proper measures to facilitate connection to the network of family generators through companies in the sector.

⁷³ EIA. "Most new residential solar PV projects in California program are not owned by homeowners." 17th September 2013. According to the "solar initiative programme" of the over 55 megawatts installed in June 2013, only about 15 belonged to the owners of the house. The remainder, about 40, were the property of an electricity company which sold all the energy produced to the owner or which gave a monthly price. In both cases, the price paid by the owner is always less than what he would pay on his bill if he received mains electricity.

The challenges to security of supply

“The International Energy Agency (IEA) is an autonomous organization, created in November 1974. Its original mandate had, and continues to have, a double aspect: to promote energy security between its member countries by means of a collective response to the material interruptions of oil supply and to investigate and analyze in a reliable manner the possibilities of guaranteeing secure, accessible and clean energy for its twenty-eight member countries and for third parties.”⁷⁴

The IEA is the paradigm of security of supply and it was with this objective that it was created forty years ago, just after the first and only oil embargo that the west has suffered. Thus, the evolution of the agency offers us the clearest possible example of the new vision of energy security, and how this has become the fringe on what the balance of the system of global governance pivots.

China is not only part of this reality but is one of the key pieces of the energy *trilemma*: security, accessibility and the environment. In itself, it embodies, better than anywhere else, the challenges involved in the energy paradox:

- The emissions of greenhouse gases, environmental contamination and vulnerability to scarcity of water.
- The impossibility of access to modern forms of energy, me to the high cost, which makes this fundamental right inaccessible to over a fifth of the population.
- Oil, due to its calorific density and its facility for ease of handling will continue to be the central element of its energy security⁷⁵. The new geography of demand and supply implies a reordering of the commercial flows of oil towards the Asiatic markets, with implications for the efforts of cooperation to guarantee the security of supply⁷⁶.
- The high price of oil and the regional differences in the cost of natural gas and electricity, which have a direct effect on industrial competition and sustainable economic development.

⁷⁴ IEA. WEO 2013_ The IEA has set up an integral energy cooperation programme among its member countries, each one of which is obliged to maintain oil reserves equivalent to 90 days' net imports.

⁷⁵ Energy Research Institute. National Development and Reform Commission. *China Energy Outlook*.

⁷⁶ “The Asian imports will come not only from the Middle East (where total crude exports will begin to be unable to respond to Asia's import needs), but also from Russia, the area of the Caspian Sea, Africa, Latin America and Canada. The new refining capacity oriented towards exports from the Middle East raises the possibility that oil products will gain a greater presence in world trade instead of crude, but a large parte of that new capacity will ultimately serve to satisfy the growing internal demand of the region itself.” IEA. WEO 2013

- The efficiency, technological development and integration of the energy market globally and in a more competitive manner.
- The adaptation of the electricity market to generation from renewable sources⁷⁷ and the role of nuclear energy⁷⁸ after the nuclear crisis in Japan.

Fossil fuels. Difficult political decisions

"Speaking in Hong Kong last year, Dr. Li Junfeng, deputy director general of the Energy Research Institute in Beijing, argued that the 12th FYP with its ambitions to turn China into a model of low-carbon growth, was likely to have uneven results, due to differences in development. Local variations, he explained, were both predictable and necessary. <It's very difficult,> he said, <to have a goal for the entire country. We need local flexibility>".⁷⁹

The owners of coal mines in China have traditionally been highly fragmented, including large companies of a state-owned nature, companies belonging to the provincial governments and thousands of mines whose owners were the local or municipal authorities. The ten main companies nationally do not exceed 30% of total domestic production. The most important company in China, and the world, Shenhua Coal, only occupies 10% of China's internal market.

The most important problem of this fragmentation is that tens of thousands of small local mines are highly inefficient, due to the lack of investment in new equipment and safety systems, despite the fact that they are a considerable proportion of total production. The objective of consolidating the coal industry involves attracting greater investments in new

⁷⁷ EIA. Country report. "China has a goal to generate at least 15 percent of total energy output by 2020 using renewable energy sources as the government aims to shift to a less-resource intense economy. China invested \$264 million in renewable energy projects in 2011, and plans to spend \$473 billion on clean energy investments by 2015 as part of the latest Five-Year Plan."

⁷⁸ EIA. Country report. "China is actively promoting nuclear power as a clean and efficient source of electricity generation... [it] plans to boost nuclear capacity to at least 70 GW by 2020. As of mid-2012, China had 15 operating reactors and 30 reactors with over 33 GW of capacity under construction, about half of the global nuclear power capacity being built. Following Japan's Fukushima Daiichi nuclear accident in March 2011, China suspended government approvals for new nuclear plants until safety reviews are completed for current plants and those under construction (finished at the end of 2011), and a safety framework for all nuclear facilities receives final approval by the State Council. The safety reviews were completed in late 2011, and the State Council approved a safety plan for all facilities in May 2012 allowing for new plant approvals to resume."

⁷⁹ Hilton, Isabel et al. *China's Green Revolution Energy, Environment and the 12th Five-Year Plan*. China Dialogue. www.chinadialogue.net/reports

technologies, improving safety, the protection of the environment, and correcting a highly unfavorable reputation.

In order to control the excessive growth of production, the 12th Five-Year Plan sets a ceiling of 3.9Btm and a maximum capacity of 4.1 Btm in 2015. Also, in order to improve efficiency and safety in the mining industry, the National Energy Agency intends to concentrate 60% of production in ten large companies and ten medium-sized companies, while at the same time, limiting the total number of these at a maximum of 4,000, forcing alliances and acquisitions. Furthermore, despite the strategic status of the sector⁸⁰, it is more open to foreign investment, in an effort to introduce new technologies, and to modernize the methods of extraction from its large mines.

The most important efforts at investment and development are centered on two fundamental areas, internal transport, by means of liquefaction⁸¹ and the production of methane, as well as systems for reductions of emissions of CO₂ into the atmosphere.

The environmental problem surpasses the rest, above all in the north of the country at the beginning of the winter, when heating needs are added to industrial emissions. The images of entire towns with masks for breathing, the studies on effects on the fertility of the population, the differential in life expectancy from one region to another and cases such as the recent death of an eight-year-old girl as a result of pollution, according to her doctor,⁸² are putting the Chinese authorities under ever more intolerable pressure⁸³, and the system on which the amazing development and progress of the country is based. A palpable example of the

⁸⁰ While in the US the majority of power stations are reaching forty years of age, since they were created with the OPEC embargo, supplying some 20Gw with performance of less than 30%, in China, the super-critical modern power stations, with over 1Gw of power and less than 20 years' operation, supply electrical power of over 160Gw.

⁸¹ This procedure, put into practice during the war to prevent blockades, involves a large additional cost, a great deal of contamination and the use of a large quantity of water. China is the only place in the world which has a production facility, built in 2009, belonging to the Shenhua group and located in the autonomous region of Inner Mongolia, with a diesel production capacity of 24,000 Bld, and which it is apparently intended to increase to 240,000Bld in 2015.

⁸² http://sinosphere.blogs.nytimes.com/2013/11/05/an-8-year-old-girls-lung-cancer-is-blamed-on-air-pollution/?_r=0

⁸³ "Extensive development of fossil energy, particularly coal, has had a serious impact on the eco-environment. Large areas of arable land are taken up for other uses or even spoiled, water resources are seriously polluted, the discharge of carbon dioxide (CO₂), sulphur dioxide (SO₂), nitrogen oxides (NO_x) and toxic heavy metals remains high, and emissions of ozone and particles smaller than 2.5 micrometers (PM_{2.5}) are increasing. For a long time to come, fossil energy will continue to dominate the energy consumption mix, posing a growing challenge for protecting the environment and countering climate change. A more environment-friendly energy mix is urgently needed." White Paper: "China's Energy Policy 2012". October 2012, Beijing. State Council

importance of the political challenge of contamination is the existence of the Environmental Protection Ministry (EPM) when there is no Ministry of Energy.

The most recent steps taken in September by the State Council⁸⁴ concentrate on three areas: Beijing-Tianjin-Hebei, the Yangtze River Delta and that of the Pearl River⁸⁵, drastic measures to reduce the average level of particles in suspension⁸⁶, although the objectives have been considered to be not very realistic. Last June, the State Council restated its desire to achieve the objectives, and set down ten national measures which are divided so, as to complete thirty-five specific developments which are centered above all on the reduction of the consumption of coal and emissions from traffic road⁸⁷.

In 2017, the proportion of coal in energy consumption must be reduced to 65%⁸⁸ and the proportion of renewables has to reach 13%, of which 50Gw will be of nuclear origin. Furthermore, in the three special regions, the installation of new coal-fired plants is prohibited, and the consumption of coal must be reduced, which will affect the amount imported. Meanwhile, in those regions, in 2015, the vehicle registration certificate will not be renewed for any vehicle that is older than ten years. This

⁸⁴ The Plan of Action to prevent pollution was published on 12th September 2013, eight months after the grave episodes of contamination which affected almost a sixth of the territory. In the plan, the situation is considered serious and its influence on the health of the population is affecting social harmony and stability.

⁸⁵ "China's <three key regions>, the Beijing-Tianjin-Hebei region, Yangtze River Delta and Pearl River Delta, combined with the Shandong province, consume one third of all coal in China. Coal-burning is heavily concentrated around Beijing: one third of China's coal is burned within 600 kilometers of Beijing..." Greenpeace. "China clean air plan to slow coal consumption". September 2013

⁸⁶ "[The] deficient health systems would cease to be the main cause of premature death with that sad honour passing to atmospheric contamination due to the levels of particles in suspension, above all in certain Asian cities, which would amount 3.6 million deaths [2050], more than three times the current number which is estimated at a million." GARCIA SANCHEZ, Ignacio. "Los potenciadores de riesgo. El cambio climático". February 2013. Madrid. Strategy Notebooks. Ministry of Defence

⁸⁷ "Concern about air pollution has grown sharply in recent years, according to a Pew Research Center survey from this past spring. In that survey, 47% of Chinese said air pollution was a "very big" problem facing the country, up from 31% in 2008 and 36% last year. Air pollution ranked fourth out of 15 issues in terms of public concern, behind rising prices (which 59% of people cited as a very big problem), corrupt officials (53%) and the gap between rich and poor (52%)." The contamination of water, which in 2012 represented 33%, rose in 2013 to 40%. <http://www.pewresearch.org/fact-tank/2013/10/22/as-china-coughs-and-chokes-public-concern-about-air-pollution-rises/>

⁸⁸ The reductions in coal should be of 40Mt in Hebei, 20Mt in Shandong and 13Mt in Beijing. These three provinces consumed more coal in 2011 than the entire European Union. These provinces have increased their consumption by an average 6% annually, with the result that the objectives for reductions in absolute terms requires a dramatic change in the tendency of consumption.

measure, eliminating all vehicles registered before 2005, will be obligatory throughout the country from 2017.

These actions have been followed by the plans of local authorities⁸⁹, as in the case of Beijing, in which, among other measures, a maximum of six million vehicles authorized to drive in the city in 2017 has been set. Likewise, in order to stimulate these actions at the local level, the politburo will publish the ten best and ten worst cities in relation to air quality on a monthly basis.

Furthermore, the EPM has developed a more detailed plan for Beijing, Tianjin, Hebei, Shandong, Shanxi and Inner Mongolia, in which the following are worth emphasizing for their harshness: the closure of 1,200 highly contaminating companies in Beijing by 2017; the reduction in steel production capacity of 20 Mt in Tianjin, 6.7 Mt in Shanxi, 60 Mt in Hebei and 10 Mt in Shandong; the production of cement by 5 Mt in Tianjin and Inner Mongolia; 14 Mt of coal in Tianjin, as well as the fact that at the national level, an air monitoring system will be developed which will allow constant monitoring of the quality values, with a very demanding reduction in the levels considered tolerable.

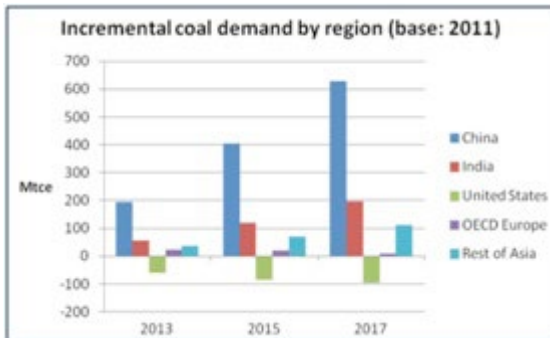


Figure 5.11b

Despite the efforts of the political authorities, the growth in demand in 2017, in accordance with the estimates of the IEA, will be eight times greater than the reduction that is forecast in the US (see figure 5.11b)⁹⁰. A battle, the reduction in the consumption of coal, which, as we have seen,

⁸⁹ The ceilings set up to now for Hebei, Shandong and Beijing require an absolute reduction in the consumption of coal of a total of 73Mt between 2012 and 2017. However, in comparison with the figures which would be achieved if current consumption continued, it means a reduction of over 150Mt, more than Germany's total consumption. The speed of the reductions required is quite high, approximately 2.5% annually, which is much more rapid than the rates of reduction of emissions of CO₂ than the industrialised countries made a commitment to at the Copenhagen climate conference.

⁹⁰ IEA. Medium Term Outlook for coal. 24th January 2013

is fought on all fronts, with wind and solar energy substituting for up to 100 Mt of coal, hydraulic energy up to 150 Mt, nuclear 80 Mt and natural gas about 100 Mt. It is in the natural gas substitute has where most of the effort is going to be done.

The main regions of production of natural gas are as follows: in the southwest, the province of Sichuan; in the northwest, Xinjiang and Qinghai; in the north, Shanxi; and in the northeast, Changqing. It is also produced in the shallow waters of the yellow sea and the southern sea, while at the same time explorations are taking place in deeper waters, and for unconventional gas with large multi-national companies. Although the great challenge is the regulation and integration of the internal market, where the local authorities still, in their territorial areas, exercise total control in gas distribution.

Other difficult political decisions refer to the assessed reserves in the deep waters of both seas, and the territorial disputes between all the countries in the area, which have, up to the present, delayed the study of their potential large scale development.

The oil reserves estimated in China's eastern sea are of between 60 and 160 Mbl⁹¹, with the result that it does not seem, in the medium term, the China will be a significant producer of crude. The extraction of crude from uncontested areas reached its maximum level in the 1990s, without ever exceeding 10.000Bld, while negotiations with Japan for the joint exploitation of several deposits, which began in 2008, were soon broken off as a result of the Chinese declaration of sovereignty over the proven deposits. The dispute, with demonstrations of strength by both parties has escalated recently with the unilateral declaration by China of an Air Defense Zone, which includes all the islands in dispute, and which has led the US to respond by exercising its right to strategic freedom of manoeuvre with two B-52 bombers overflying the area. Meanwhile, China is exercising its claimed sovereign right without, for the moment, escalating the conflict and endangering the stability and freedom of trade in the region.

In relation to gas reserves, the figures vary even more. While the EIA estimates reserves of up to 2,000 Tcf, Chinese sources reach 250.000 Tcf, the majority in disputed areas. The interest on the part of the Chinese authorities in bringing the area into production is very great, just as to be able to supply the important region of the Yangtze River delta.

In relation to China's southern sea, the disputes include the sovereignty of the Spratly and Paracel Islands, which has not prevented their exploitation by the countries of the area; although the progressive development of the region, and the growing need for domestic energy supplies, augmented by the high prices and the need to reduce the use of coal by

⁹¹ Reserves estimated by the EIA and Chinese sources respectively.

means of greater use of natural gas, is causing an increase of tension, with the presence of ships with in the disputed area, is causing more and more frequent incidents.

Although, it is difficult to determine the reserves due to the difficulty in carrying out explorations in the disputed areas, from the latest findings in the territorial seas, it is estimated that there may be up to 11Bbl of crude and 190,000 Bcf of natural gas. Apart from these estimates, the USGS⁹², in its most recent survey of 2010, evaluated the undiscovered reserves at between 5 and 22 Bbl and between 70.000 and 290.000 trillion cf, while the CNOOC, in November 2012, increased these estimates to 125 Bbl and 500.000 trillion cf.

However, the disputes about the sovereignty and the delimitation of the maritime boundaries in the area are not the principal problem for exploitation natural resources. Hence, the waters in dispute present some very significant technological and geological challenges due to the deep valleys and the strong underwater currents. Also, the region suffers seasonally from tropical storms and typhoons, a clear example being the recent and devastating passage of the typhoon Hayian through the Philippines, which, in accordance with the latest statistics, brought 5.632 dead, 26,136 injured and 1,759 missing, with close to eleven million people affected and damages of some \$700M. In order to reduce the scale of these challenges, Chinese companies are developing associations with international companies, above all American, Mexican and Brazilian ones, to incorporate the deep-water oil extraction technology used in the Gulf of Mexico and the Exclusive Economic Area of Brazil.

The irresistible access to the golden age of unconventional gas. A revolution yet to arrive

“China’s efforts to expedite the development of unconventional oil and gas resources are an important way to enhance its security of energy supply. It will speed up the exploration for and use of coal-bed gas, increase the proven geological reserves, and push forward the construction of industrial bases in the Qinshui Basin and eastern edge of the Ordos Basin. In order to accelerate the development of shale gas, the country will select a group of prospective areas and favorable exploration target areas, intensify efforts to solve difficulties in core technology, set up a new development mechanism, implement incentive policies for the shale gas industry, and improve supporting facilities. China aims to increase its annual output of shale gas to 6.5 billion cu m by 2015, and lay a solid foundation for the future rapid development of

⁹² USGS. U.S. Geological Survey. www.usgs.gov

shale gas. In addition, it will strengthen the development of shale oil, oil sand and other unconventional oil and gas resources."⁹³

The entry of the golden age of unconventional gas into China has some conditions to different those of the United States. Some of them deal with technological capacity of Chinese companies, to the property regime governing the land, its geological characteristics and the regulatory framework of the market. It is necessary to understand that US companies have been using these techniques for decades, favoured especially by the free market and the fact that, only since 2009, when the techniques used and the increase in the price of oil, encouraged by the commitments made to reduce CO₂ emissions at the Conference of the Parties (COP) in Copenhagen, have led prices to clearly diverge (see figure 5.12)⁹⁴, making these gas extraction techniques highly competitive.

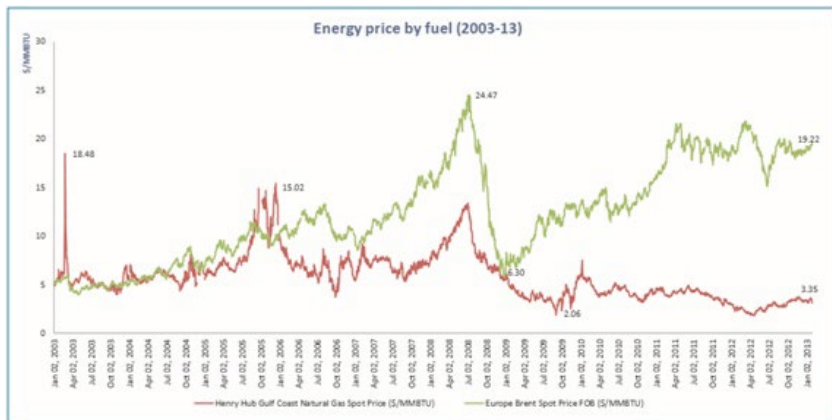


Figure 5.12

However, the relatively potential of clean energy that greater resources of unconventional gas can generate in the world, 1,275 quintillion cubic feet according to the EIA (see figure 5.13)⁹⁵, have impulse on the Chinese government, on the legal, commercial and technological framework, to boost the development of this new energy source. Thus, in March 2012, within the development of the five-year plan, 229.550Bcf by 2015 and

⁹³ White Paper: "China's Energy Policy 2012". October 2012, Beijing. State Council

⁹⁴ CSIS energy and national program. "Realizing the potential of U.S. unconventional natural gas". April 2013.

⁹⁵ EIA. "Technically Recoverable Shale Oil and Shale Gas Resources: An Assessment of 137 Shale Formations in 41 Countries Outside the United States." June 2013. KUSHKI-NA Ksenia. "Golden age of gas in China. Is there still a window of opportunity for more gas exports to China?" and CSIS energy and national program. "Realizing the potential of U.S. unconventional natural gas". April 2013. The left-hand graph refers to China and the right-hand graph to the US.

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3,000 Tcf by 2020 were set as annual objectives, which would mean doubling the current volume of production of natural gas. The companies consider these figures highly optimistic, as they are at an initial stage from the technological point of view and regarding evaluation and testing. This reticence has been noticeable in the recent assignments of lots of land, where the main state and multi-national companies have been reluctant to present bids.

Table 6. Top 10 countries with technically recoverable shale gas resources

Rank	Country	Shale gas (trillion cubic feet)	
1	China	1,115	
2	Argentina	802	
3	Algeria	707	
4	U.S. ¹	665	(1,161)
5	Canada	573	
6	Mexico	545	
7	Australia	437	
8	South Africa	390	
9	Russia	285	
10	Brazil	245	
World Total		7,299	(7,795)

¹ EIA estimates used for ranking order. ARI estimates in parentheses.

Figure 5.13a

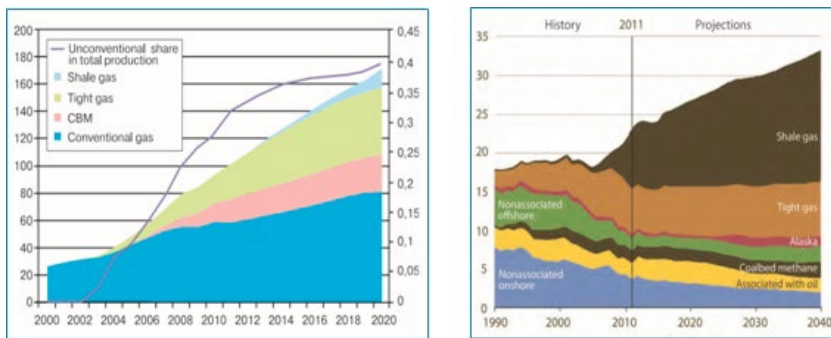


Figure 5.13b

Numerous challenges arise with this revolution which is changing radically the American energy map, and which looks as though it may reach other parts of the planet, although more slowly, and especially Asia and, more particularly, China. Thus, in China, the challenges complicate and slow down its commercial development, especially the tectonic complex-

ity of its main deposits, which are very young and therefore have many faults, which increases one of the main drawbacks in this kind of exploitation, seismic risks of hydraulic fracture, making them in some cases non-viable from a commercial point of view.

This problem has prevented greater exploitation of CBM⁹⁶ which, despite its potential, has stayed at 500 Mcfd after over 20 years' operation. Another no less important aspect is the transparency and availability of data, from open sources which are normal in other countries but in China are considered state secrets⁹⁷. This availability is an essential element for evaluation and prospective study of resources and their possible exploitation.

The four main areas evaluated (see figure 5.14) in the EIA survey include:

- The so-called southern corridor, a very large area which includes the Sichuan, Jiangnan and Subei basins, and the Yangtze platform, offers the greatest potential of reserves. However, while the quality of the rock is similar to certain North American deposits, the faults and structural complexity of the formation, as well as the excessive depth, signify considerable technological challenges to exploitation in the short and medium term.
- The Tarim basin, located in the Uyghur autonomous region of Xinjiang, China's largest sedimentary plateau, with an area greater than that of Spain and 1,000 meters above sea level. Although it is dry, the aquifers which underlie the region and its small population favor its use, as another of the great challenges presented by its commercial exploitation is the availability of abundant sources of water;
- The Junggar basin, of over 160,000 km², is located, like its neighbor the Tarim river basin, in the Uyghur autonomous region of Xinjiang, although it is less distant from potential markets and services, and also has better infrastructure, including the capital of the region, Urumqi, with three million inhabitants and the technological centre of the PetroChina company in Kelamayi. The region is undergoing a rapid development, thanks to the growing exploitation of its large oil,

⁹⁶ "China is estimated to have 10.2Tcf so far of proven CBM reserves in 2011, though estimates for recoverable reserves are much higher at over 350Tcf. Most of China's CBM volumes are from the basins in the North and Northeast, the Sichuan basin in the Southwest, and the Junggar and Tarim basins in the West... As part of the 12th Five-Year Plan, China's NEA has a target of producing 1,060Bcf/y by 2015. Another goal is to increase the utilization rates from less than 40 percent to over 60 percent by 2015, reducing the significant production waste. China's first commercial CBM pipeline became operational in late 2009, linking the Qinshui Basin with the West-East pipeline. Two additional long-distance pipelines have become operational, and several more are under construction." EIA. Country report. China

⁹⁷ EIA. ARI World Shale Gas and Shale Oil Resource Assessment. China chapter. 17th May 2013

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gas and coal reserves, increasing its potential as a result of the geological and technological conditions and access to water. As a result of which there are already agreements with Shell and Hess to study its commercial exploitation.

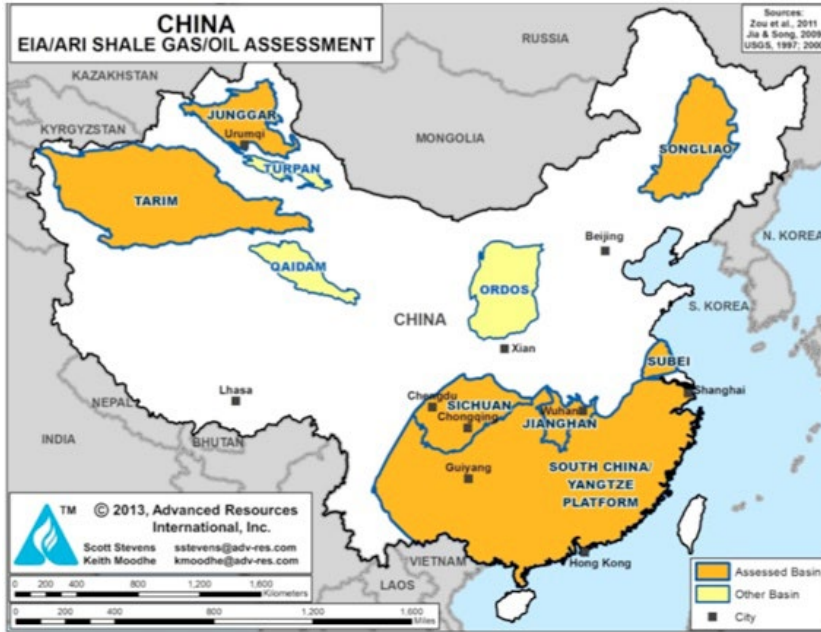


Figure 5.14

- The Songliao basin in the NE, with an area of close to 300,000 Km². has the largest oilfield, Daqing, at 800Bbld. Only recently has the potential capacity for natural gas production begun to be considered with new discoveries in relatively superficial locations. PetroChina has informed that it has already begun to produce unconventional oil, while it is studying the possible commercial exploitation of its reserves of gas with Hess, despite their structural complexity due to the sedimentary origin, which causes recurrent seismic movements.
- In the technological aspect, the companies in the sector are beginning to acquire the capacity to drill wells horizontally on a large scale, combined with massive hydraulic stimulation at different levels⁹⁸. Hence,

⁹⁸ "Sinopec's presentation at the 4th Annual Unconventional Hydrocarbons Summit 2012 described how China's 12th five-year plan calls for drilling 50 exploration wells, 150 production wells, and 990 water wells to verify 35.3 tcf geological and 7.06 tcf recoverable reserves by 2015. Thus far, 39 shale gas exploration wells and 12 production wells have been drilled in China, compared to about 35,000 wells that were drilled in

they are cautious when evaluating the capacity for progress of the sector, considering the objective of the ANE of 7,7Bcfd in 2020 ambitious. Of fundamental importance to achieving this aim are the agreements with foreign companies, which will allow them to overcome the significant technological challenges. Thus CNPC and Shell signed an agreement in March 2012 to exploit a deposit of unconventional gas in the Sichuan basin. Also, State Council is making prospecting rights more flexible for national companies of the sector in previously assigned sectors, allowing the Ministry of Land and Resources (MLR) to open auctions of extraction blocks to local companies and foreign investors, provided that the foreign ones from a joint venture part with a Chinese company.

The deterioration of the environment. The Climate Change on the horizon

"The scientific assessment contained in the Working Group I report of the IPCC's Fifth Assessment Report released last September further reveals the authenticity of global warning and the urgency in addressing the challenge of climate change. Science and reality have shown us that climate change has become a real and severe threat to sustainable development, and that all countries should work hand in hand to tackle it through sincere cooperation."⁹⁹

If climate change is the universal challenge of the 21st Century, and the energy sector is its main cause¹⁰⁰, China faces an even more fearful and complex challenge. The foreseeable consequences of its effects will have very severe effects on the Chinese ecosystem and, above all, on its sources of water¹⁰¹; apart from suffering locally the deterioration of the environment with prohibited contamination levels; and suffered by the region the devastating consequences of the more and more frequent and catastrophic extreme natural phenomena.

Thus, at the present stage of development, with a per capita energy consumption that is far below the objective set by the Communist Party for

the United States in 2006 alone. Additionally, among the shale gas wells in China, only nine have a daily output level of over 350 mcf, which is three to nine times lower in productivity when compared to an average U.S. shale gas well." NAKANO, Jane. "China Awards More Shale Gas Blocks although Much Remains to be Seen". 29th January 2013.

⁹⁹ ZHENHUA, Xie. Head of Delegation, Vice Chairman of the National Development and Reform Commission, People's Republic of China. *Speech on the High Level Segment of Warsaw Climate Change Conference*. 20th November 2013

¹⁰⁰ IPCC. Working Group I. Fifth Assessment Report. "Climate Change 2013: The Physical Science Basis."

¹⁰¹ See IEA. World Energy Outlook 2012. Chapter 17. "Water for energy. Is energy becoming a thirstier resource? Regional stress point. China". Page 518.

the celebration of its centenary, the systemic challenge of climate change looks formidable¹⁰². Socio-economic welfare, energy consumption and political legitimacy are opposing forces that the members of the politbu-ro put forward from an stance of global leadership. They acted as such at the Copenhagen conference in 2009, with over 300 heads of state, and so they participate together with the group of 77 in the discussions on climate change.

On this line of thought, the ERI¹⁰³, in one of the recommendations of its prospective study, emphasizes that China and the developing economies should have an active role in energy governance with special attention to energy security, climate change and technological innovation. However, ERI warns that China must improve its position as a leading country, through joining together with other developing countries so as to optimize the analytical systems on the reality and the statistics on energy data. A vision which transfers us to the ideological positions of the past century in the terrain of the challenges of the new century.

In this order of things, it considers that the international community should understand the rapid growth of energy demand of developing countries and especially emerging nations. Also, it should be considered that the unfavorable natural conditions of many of them and their technological backwardness oblige their governments to fight for *"the survival and development of their own people"*; thus, China is paying *"more and more"* for energy resources for the *"survival and development of its people, while it has to consume coal as a basic energy resource"*.

But the Chinese government knows that it is playing for high stakes. The survival of an inheritance: *"represented by the founding of the People's Republic of China by fighting a twenty-two-year war with the cost of more than twenty million lives, a war fought by the Chinese people under the leadership of the Communist Party... This is not an empty word. It is something which has been proven and tested over several decades of experience"*¹⁰⁴. And so, the efforts made by its authorities are formidable,

¹⁰² "Energy is the material basis for the progress of human civilization and an indispensable basic condition for the development of modern society. It remains a major strategic issue for China as the country moves towards its goals of modernization and common prosperity for its people... However, China's energy development still faces many challenges. The country's energy resource endowment is not high and its per-capita share of coal, petroleum and natural gas is low." White Paper: "China's Energy Policy 2012". October 2012, Beijing. State Council

¹⁰³ Energy Research Institute, National Development and Reform Commission. "China Energy Outlook". Executive Summary

¹⁰⁴ KISSINGER, Henry. "On China". (2011) The Penguin Press. New York. Kissinger quotes the words of Deng Xiaoping to the American envoy after the events in Tianan-

in the words of the IEA, it is as if there were a system of taxes for coal consumption in the shade which causes the movement of the market to improve efficiency and aim for its replacement with cleaner energy sources.¹⁰⁵

In this way, over the last eight years, energy consumption per unit of GDP has been reduced by 26.4%, which represents a saving of 980 Mtm of coal, 2.350 Btm of CO₂, and a reduction of 28% in the energy intensity of coal. At the same time, the percentage of non-fossil fuels in the energy mix grew to 9.6%, in which the proportion of renewable energies is the largest in the world.

Also, while the prospects of a competitive CO₂-capturing system (CCS, Carbon Capture and Store) recede from the immediate horizon, the Chinese government is making a remarkable effort to increase its forests, exceeding the initial objective of 1.3 Bm³ by almost 500 Mm³. Other actions are: mobilizing the social conscience by encouraging the people's participation, best practices and way of life by means of the "National Low Carbon Day"¹⁰⁶; and the start of the "Shenzhen Carbon Exchange" pilot project, which signals a decisive step in the development of a carbon emissions quota market.

In the international field, in order to encourage South-South cooperation, it has made \$10M available each year, between 2011 and 2013, for the development of capacities of adaptation in other countries, as well as courses in over 114 countries and a large number of donations of efficient systems, above all in the field of hydro-electricity and other renewables, in as many as twelve countries. And, on the way to 2020, with the commitment to reduce CO₂ emissions per unit of GDP by between 40% and 45% in comparison with the levels of 2005, it would be necessary, with eyes on the date in Paris in 2015, to increase the interest of the population in its importance, since in 2013 it only achieved 39%, 40% in the US, and 89% in Europe.¹⁰⁷

men Square. Page 419.

¹⁰⁵ "China's emissions in 2012 grew by one of the smallest amounts in a decade (300 Mt), as almost all of the 5.2% growth in electricity was generated using low-carbon technologies mostly hydro and declining energy intensity moderated growth in energy demand." IEA. "Redrawing the Energy-Climate Map". 10th June 2013.

¹⁰⁶ "Around 60% of the global savings in emissions are from the buildings sector [energy performance standards in buildings for lighting, new appliances, and for new heating and cooling equipment]. In countries where these efficiency policies already exist, such as the European Union, Japan, the United States and China, they need to be strengthened or extended." IEA. "Redrawing the Energy-Climate Map". 10th June 2013.

¹⁰⁷ <http://www.euractiv.com/climate-change/french-socialists-want-climate-c-news-531463>
Visited on 4th November 2013.

The technological revolution. A dream at a distance

*«God forbid, India should ever take to industrialisation, after the manner of the West, the economic imperialism of a single tiny island is keeping the world in chains – if an entire nation (India) of 300 million people took to a similar economic exploitation, it would strip the world bare like locusts».*¹⁰⁸

Human development has followed a path set by the technological revolution, allowing the supposed limits of progress to be systematically exceeded. In this regard, humanity has always felt itself to be supported by a creativity and inventiveness which has led it not to let any limit imposed by nature. Thus, economic, demographic and social projections which have been offered invariably by groups of scientists and ecological organizations, as warning signals to change the path to a more sustainable and balanced development, have been the subject of political debate, as well as critical elements to attain a more harmonious and balanced framework of security and development.

We may currently consider that we are at the verge of one of those choices. The fifth scientific report from the IPCC sets out unequivocally the fundamentally human nature of global warming, boosted by the growing energy consumption of fossil fuels; and, although the consequences are still to be determined, a new technological and industrial revolution is liberating millions of people from poverty, allowing an ever growing proportion of the population to have access to a middle class way of life.

Key for China, due to the need that it has to use fossil fuels, mainly coal, the cheapest source of energy and geopolitically highly stable. should be the development of a clean, efficient and accessible system which will make it possible to capture and store CO₂ emissions in a safe way.

However, the lack of progress in the technological development of CCS systems is upsetting as all the projections and models of sustainable future scenarios require its commercial deployment in electricity generation and industry. The CCS systems would be the technological frontier which would permit the industrial sectors, such as iron, steel, cement and the processing of natural gas, to reduce the rate of emissions so, its implantation in the future is critical. If a commercially viable system were not achieved, the basic cost to achieve the same level of reduction of emissions would increase by 40%, with an estimated total figure of \$2.000B over forty years. At the same time, the pressure on other options for reductions of emissions will also be greater.

Thus, China, in its twelfth five-year plan aims to duplicate the investments in CCS development, above \$65 M, which would allow it to attract nearly

¹⁰⁸ Mahatma Gandhi (1928)

\$400 M, over twice the capital invested between 2006 and 2010. Alstom SA, the third largest electrical equipment company, based in France, and Chian Datang Corp. signed an agreement to develop a prototype and store CO₂ in large oilfields, such as Levallois-Perret.

China with twelve projects at different stages of progress, compared with five in 2010, appears just behind the United States in research and development into these systems. In this line, a memorandum of understanding was recently signed in London¹⁰⁹ for the establishment of a wide network which would give an incentive to research and development in this area and, in the medium term, three or four years, to carry out demonstrations from a commercial point of view. In the same meeting, the British Minister of Energy and Climate Change and the Governor of the province of Guangdong signed an agreement to develop these technologies.

The second key technological aspect for China is the dependency of its transport and logistical sector¹¹⁰ on oil, a pivotal element for its energy security. Dominated by high prices and a geo-political environment considered from the Chinese point of view as a rising energy nationalism: *"... over the last 100 years it has evolved from the land to the sea and the polar regions, while countries face their energy security and attempt to protect their sovereignty and integrity. The main characteristics include: defense of sovereignty over their energy resources by all countries in all regions, disputes and complaints over areas reach in natural resources, and geo-political conflicts inherited from the past"*¹¹¹

Among the key aspects considered in its five-year plan, apart from the general objectives¹¹², there are other more specific ones such as: reaching 83.000 Km of motorway¹¹³ from the current 74.000 Km (in the United States and the European Union there are nearly 100.000 Km), constructing an airport in Beijing and going from the 175 airports in the previous

¹⁰⁹ The UK Carbon Capture and Storage Research Centre (UKCCSRC), Scottish Carbon Capture and Storage (SCCS), Guangdong Low-carbon Technology and Industry Research Centre (GDLRC) and the Clean Fossil Energy Development Institute (CFEDI) signed the ten-year Memorandum of Understanding (MoU) at Lancaster House, in London, witnessed by Governor Zhu Xiaodan of Guangdong Province, People's Republic of China, and Minister Greg Barker of the UK's Department of Energy and Climate Change (DECC)

¹¹⁰ The congestion and the low velocity of road traffic is a fundamental factor in the inefficiency of domestic transport and industrial logistics, with costs which represent 18% of GDP, compared with 8% in the EU and 9.5% in the United States. KPMG China. "Logistics cost as a percentage of GDP".

¹¹¹ ERI. *"China Energy Outlook"*. Executive Summary, 1st November 2012.

¹¹² Increase in the use of non-fossil fuels up to 11.4%, reduction in the energy consumed per unit of GDP of 16% and a reduction in emissions per unit of GDP of 17%.

¹¹³ For rural areas, the objective is to ensure that in 2015, all cities and 90% of villages are accessible with vehicles. At the beginning of the current five-year plan, 1,200 towns and 120,000 villages did not have asphalted roads.

plan to 220 in the current one, all of which, although inevitably increasing consumption, will improve efficiency and capacity in the transport and logistics sector. In this way, the efforts are multiplied to encourage clean traffic, putting special emphasis on the use and improvement of the internal waterways¹¹⁴, increasing the high-speed railway network up to 45.000 Km., and the links between cities of over 500.000 inhabitants. Also, the transport of coal by train, which amounts currently to 80% of the total, has a special treatment as strategic infrastructure. This last is a sector in which the use of liquefied gas in diesel motors is viewed with great optimism.

However, that important effort is tarnished by the current expectations for achieving the objectives set by one of the priority sectors in the five-year plan, "*clean energy vehicles*". Despite the fact that, in 2007 for the first time, a member of the cabinet, who was not a Communist Party member, was appointed¹¹⁵, a personality in the research of new batteries for cars, the development of electric vehicles continues to be disappointed and the cost continues to prevent its large-scale commercial use. The expectations for achieving two million electric vehicles in 2020 seem to be far from reality (figure 5.15)¹¹⁶. In order to achieve this, the Chinese authorities intend to boost and concentrate the production of electrical batteries in two or three companies with 10.BKwh of production capacity. The plan is to reduce the cost from \$0,33 to \$0,25 per kWh.

Despite the enormous progress in other areas, such as renewable energies, the fundamental problem in the auto sector is its fragmentation. This diversification arises from the importance that the automobile industry has in employment and in the economy of the different provinces, with the result that the local authorities do not wish to lose control over it. Thus, the production of electrical vehicles extends over 23 provinces which only reach the 45% of total units, with the result that it is very difficult to achieve a commercial product. Despite state incentives, which means as much as \$9,000, of the over one hundred thousand electrical vehicles which were expected to be put into circulation this year only ten thousand have been registered. Furthermore, the support infrastructure

¹¹⁴ China currently has up to 110,000Km of navigable waterways which amount to 67% of the total capacity transported by sea.

¹¹⁵ "...in 2007, the Chinese President Hu Jintao appointed the engineer, Wan Gang, a world authority in electrical vehicles, as Minister for Scientific Development, breaking for the first time with the tradition that all ministers must be members of the Communist Party." GARCÍA SÁNCHEZ, Ignacio. "*El Cambio Climático: Implicaciones para la Seguridad y la Defensa*". (2011) Ministry of Defence. Madrid.

¹¹⁶ Electric Vehicle Market Forecasts Global Forecasts for Light Duty Hybrid, Plug-in Hybrid, and Battery Electric Vehicles: 2013-2020: Hybrid electric vehicles (HEVs); Plug-in hybrid electric vehicles (PHEVs); Battery electric vehicles (BEVs).

in the large cities is scarce, such as Beijing which only has 64 charging stations.

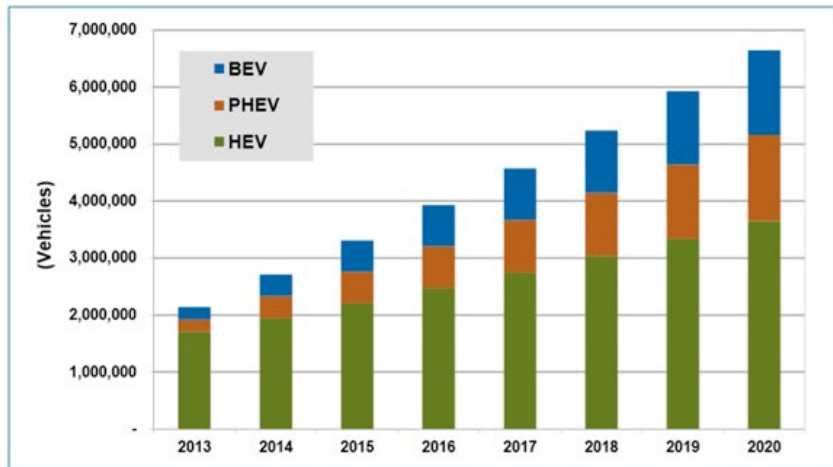


Figure 5.15

The challenge of nuclear security after Fukushima

“As North Korea threatened another nuclear test, the PRC Foreign Ministry, on January 14, 2013, shifted slightly to stress denuclearization in addition to stability. Xi Jinping then met on January 23 with an envoy of South Korea’s president-elect Park Geun-hye and stressed denuclearization on the Korean peninsula. At the same time, the PRC voted with all other members of the UNSC for Resolution 2087 to condemn the DPRK’s missile test over a month before, and impose travel bans and asset freezes on DPRK entities, including in the PRC... PRC media editorials, academic articles, and public opinion on the Internet called for toughening up on or abandoning North Korea. Official military news reported on the UNSC’s condemnation of the nuclear test and a drill in the Shenyang Military Region that involved a scenario of nuclear, biological, or chemical warfare.”¹¹⁷

Security and safety are of paramount in determining the development of nuclear energy in China. Thus, as a consequence of the nuclear accident in Japan, at Fukushima Daiichi in March 2011, the authorizations for new plants were suspended while the safety of the power stations in service were revised and of those under construction. The stress tests ended in December 2011 and the State Council approved a safety plan for all

¹¹⁷ KAN Shirley A. “China and Proliferation of Weapons of Mass Destruction and Missiles: Policy Issues”. Congressional Research Service. Washington. 11th March 2013.

installations in May 2012, allowing the planned nuclear development to continue.

Meanwhile, the privileged relationship of China with North Korea, Pakistan and Iran, the three countries on which the international community currently centers its main concerns in the field of the proliferation of nuclear armaments and launch vectors, make the geo-political giant a fundamental security actor on the international arena.

Also, the Chinese authorities are actively promoting nuclear energy as a source of generation of electricity which is clean, efficient, and stable with a useful lifetime of 40-60 years, which is longer than the power plants which use another type of fuel. In this regard, the twelfth five-year plan considers nuclear, together with wind and solar energy, one of the seven priority sectors. Thus, the politburo has approved ten new projects with an increase in capacity of 43 Gw in 2015.

Countries with rapid growth, such as China and India, need to use all possible sources of energy to support the rapid progression of their demand. The high prices of energy, the growing geo-political risks and the irresistible social pressure due to the deterioration of the environment make nuclear energy very attractive. Furthermore, modern nuclear technology is more and more efficient, safe and clean¹¹⁸.

In this regard, nuclear energy is one of the best alternatives, for the time being, to replace fossil fuels, especially coal, for the generation of electricity in an economical and practical manner. If no new reactor were to come into service in the OECD countries, and only half of those projected in the remaining countries, the additional cost for power in 2035 from other sources would involve an extra cost of \$1.500T, 10% of the total¹¹⁹. This cost would be especially hard to bear for those countries with few reserves of fossil energy of their own.

Starting from a small current capacity, 15 reactors and 12.5 Gw, which amounts to a little more than 1% of the installed electrical generating capacity, the Chinese government is planning a massive investment in new power plants to achieve, by 2020, a capacity of more than 70Gw (see figure 5.16)¹²⁰. Thus, in mid- 2012, there were 30 reactors with over 33Gw under construction, which involved half of the nuclear power under development around the world. Also, and in support of this nuclear capacity, China intends to increase its commercial and strategic reserves of uranium to the

¹¹⁸ For example, the reactors of the Fukushima power station were built before the accident at the "Three Mile Island" plant, in the American state of Pennsylvania on 28th March 1979, which led to a great improvement in the safety of designs.

¹¹⁹ "Low Nuclear Case" scenario of the IEA.

¹²⁰ EIA. Outlook 2013. Figure 5.16. Nuclear electrical generation capacity in the world, 2010, 2020 and 2014 in Gw.

same level through purchases in external markets, as well as domestic production in the autonomous regions of Inner Mongolia and Xinjiang.

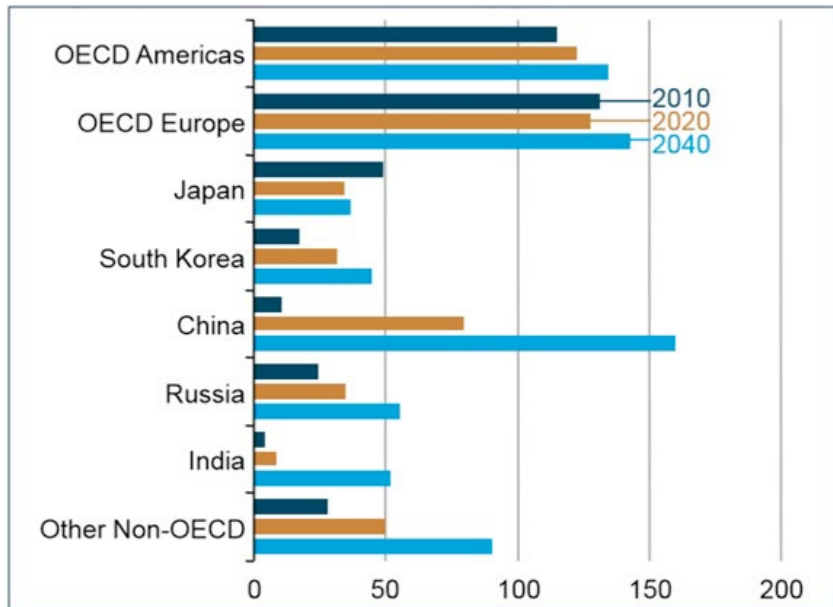


Figure 5.16

Led by China, nuclear energy will continue to be a vital component of the energy policies of many countries, especially developing countries with high growth rates. The expansion will quadruple the current nuclear plants by 2035, with eight countries in the Far East in the lead: China, Indonesia, Japan, North Korea, South Korea, Malaysia, Thailand and Vietnam. The capacity of the region is 77 Gw, 20.7% of the world total, with 33 power plants under construction of 64 around the world and 72 more of 160 planned. This proliferation of nuclear power plants in the region demands a high level of mutual confidence and cooperation. A relationship which does not have the political sensitivity of other subjects, and which due to its importance involves a significant improvement of the regional integration process.

One example is the “Top Regulators Meeting”, which on 29th November 2013 held its sixth trilateral meeting (China, South Korea and Japan), at which an agreement was signed for exchange of information in the case of a nuclear accident, as well as expert analyses and any additional technical information. Also, to check the effectiveness of the information exchange systems, exercises will be held annually directed by each of the three countries in rotation. Furthermore, joint research projects into nuclear safety will be encouraged and working systems by videoconference and online data exchange will be used.

It would seem to be advisable to integrate this mechanism into other regional mechanisms, such as the ASEAN+3 Nuclear Safety Forum, as well as with the multiple centers of excellence which exist in the region. China, with its robust nuclear programme, the good safety record, without any important accident over the last twenty years, and the diplomatic resources and commercial links in the region, should lead the cooperation effort in nuclear safety. In this regard, the experience of the Fukushima accident and the consequent stress tests, as well as the diverse strategies for disposal of used material, the supply of nuclear fuel or the creation of a fuel bank, such as that at Angarsk in Russia, are important subjects.

Thus, and against the criticisms of disproportionate development of nuclear programme associated with the traditional lack of transparency, cooperation with the International Atomic Energy Agency¹²¹, as well as the prudent reaction of the State Council of¹²² after the accident, must be a clear example of China's determination to avoid any accident in the future in anywhere in the world. Any breach of security would put its nuclear programme in grave danger, which is of enormous importance not only due to the economic investment, but also due to its great importance for improving the environment and strategic autonomy, with special influence on energy security.

Conclusions. A SWOT analysis

*"The Chinese dream, after all, is the dream of a people. We must realize this, because its realization will depend closely on the people. We must constantly transfer the advantages to the people. We must understand that the great renewal of the Chinese nation is the greatest dream of its modern history."*¹²³

China and energy are the two fundamental factors in the geo-strategic scenario of the first half of the 21st Century and, probably, for good of for ill, it will be decisive in the global geo-political panorama of the second half.

Energy is the flow of the life blood of development, it has been and will always be. But, as a necessary element for the survival and progress of

¹²¹ Cooperation with the International Atomic Energy Agency is specifically in its Training Centre and the numerous courses and seminars that it imparts.

¹²² "...The NSSA (National Nuclear Safety Administration) carried out inspection over 9 months and gave support to the subsequent deliberations of the State Council to announce the safety plan up to 2020, both documents were published on its web site for public comment and there was another four-month-long review process, including some revisions proposed by Taiwan ..." CHONG, Liu. "After Fukushima: China's Nuclear Safety": 29th May de 2013. Author's translation.

¹²³ Quotes from Xi Jinping. <http://www.xinhuanet.com/english/special/chinese-dream/>. Author's translation. Visited 18th August 2013.

any social group, its accessibility, affordability and security has caused and will cause geo-political competition and geo-strategic instability.

China has been the guest artist of the geo-political history over the last twenty years and, thanks to its audience ratings, will become, without a doubt, one of the stars in the geo-strategic script which must come on stage in the coming season. The evolution of the future scenario will depend on China's new role as a protagonist and on how the remaining actors adapt to the new story. Without any doubt, the only element of which we can be sure, right now, is that the plot will have large doses of intrigue and suspense. But whether it will develop into a tragedy, drama or comedy will depend in large part on: on the one hand, how his position as a star will affect the new actor and his adaptation to its demanding status; on the other, the attitude of the former leading actors and their adaptation to the new role which the course of the story will offer them.

If the two elements separately are factors of great geo-strategic importance, together they are one of those events which prospective analytical methodology would recognize as "*megatrends*"¹²⁴. Thus, as a summary, I intend to conclude the article with a SWOT analysis in which to set out the geo-strategic challenge which Chinese energy supply involves.

Strengths

The decisive commitment made towards clean energy sources with an incomparable capacity to carry out large projects which, due to the prestige they give, also help to legitimate the Communist Party. An effort, the strengthening of the one-party system, which has its effect on two key elements for the security of the energy supply: the great effort of political legitimization on the international stage helped by a financial liquidity at record levels, allows China's most important companies to become true multinationals diversifying their business portfolio which ensures external supply while, at the same time the anti-corruption campaign becomes even more intensified in the energy sector through the actions of President, the politburo takes advantage of the opportunity to follow the pathway of progressive energy market liberalization, with an ever-greater openness to international cooperation. In this way, it is intended to accelerate the technological development necessary to improve the capacity for the exploitation of China's own reserves and to optimize efficiency in consumption.

Weaknesses

Environmental degradation is without a doubt the great weakness that Chinese energy policy faces. The rapid economic development has been

¹²⁴ TORRÓN DURÁN, Ricardo, et al. "Prospectiva de Seguridad y Defensa: viabilidad de una unidad de prospectiva en el CESEDEN". (2007). CESEDEN monographs. Madrid.

carried out thanks to an unprecedented boost of manufacturing industry, with coal as a basic energy source.

Furthermore, the exponential growth of the urban middle class without a advanced gas infrastructure, together with the incipient incorporation of renewable energies in the electricity grid system and the slow development of clean transport means pose a great challenge in the efforts for the reduction of atmospheric pollution. But even more, the gas price level on the Asian market continues to be a very important factor which prevents a drastic reduction in the constant growth in the use of coal as a basic element of the Chinese energy mix.

Also, the political model, the administrative system, as well as the current laws related with the legal ownership of land, and the not-very-favorable geological conditions for the commercial extraction of unconventional gas, limit the possibility of following the pathway traced by the United States and, thus, benefitting from a truly free and efficient energy market with abundant gas at a low price.

Opportunities

The geo-political audience is watching China's historic development with perplexity and hope. The Chinese model, very far from the western standard, is natural and confident in its international relations, but without the messianic nature of other cultures. Its objective, the improvement of the standard of living of China's immense population, in which energy plays a central role, is the great challenge to the survival of the one-party state model. The ability to manage the great challenges presented by its achievement will dictate the success of the undertaking, at one and the same time historic and titanic and, in consequence, the continuity of the regime.

In this regard, climate change and the fossil fuel price differential open up a wide range of possibilities for development of an international nature. An opportunity for cooperation with a very demanding calendar, which requires a change of paradigm in the policies of energy supply with a displacement of the focus towards consumption. A paradigm which requires a truly global cooperative geopolitical effort in which innovation, participation and development are the main points of the new energy security framework.

Threats

Although the diversification of the supply routes, the multiplicity of available energy sources, as well as the great advances in the efficiency of consumption and the constant progress in leading-edge technologies, both in extraction and in consumption could lead us to think of a vague threat of a breakdown in energy supply, the reality is much more worrying.

The energy consumption necessary to maintain a growth rate capable of conserving the internal social stability and facilitating the slow recovery of the world economy is of such magnitude that: the situation of tension which is currently being experienced in the China seas, as well as the uncertainty in its continental neighborhood, with Afghanistan and Pakistan as hot points, together with the situation of chronic instability in the areas richest in hydrocarbons, with policies that are more and more nationalist, place the Asian colossus in a situation of special vulnerability. Likewise, the tendency to renationalize the energy business in the developed countries, and the practical absence of strategic reserves in the country might compromise the security of its supply in the future if there were a massive abandonment of the use of coal in favor of oil and gas.

Abbreviations and Acronyms

\$. US Dollar

DNA. Deoxyribonucleic Acid. The genetic material in a cell

IEA. International Energy Agency

ARI. Advanced Resources International

B. Billion. 1000 million

Bcf. Billion (1000 million) of cubic feet

Bl. Barrels of liquid fossil fuels

Bld. Barrels of liquid fossil fuels a day

Btu. British thermal unit

CBM. Coal Bed Methane

CCS. Carbon Capture and Store

Cf. Cubic feet

Cfd. Cubic feet per day

CIA. Central Intelligence Agency. United States

CNOOC. China National Offshore Oil Corporation

CNPC. China National Petroleum Corporation

CO₂. Carbon dioxide

CSIS. Center for Strategic and International Studies

EDA. European Defence Agency.

EIA. Energy Information Administration. United States

EPM. Environmental Protection Ministry

ERI. Energy Research Institute, National Development and Reform Commission. China

ETP. Energy Technology Perspectives

LNG. Liquefied natural gas

Gw. Gigawatt. A billion watts. 10^9 watts.

IPCC. Intergovernmental Panel on Climate Change

Km². Square kilometers

kWh. Kilowatt hour

M. Million. 10^6

MOU. Memorandum of Understanding

Mtm. Millions of metric tons

NOC. National Oil Company

OECD. Organization for Economic Cooperation and Development

OAPEC. Organization of Arab Petroleum Exporting Countries

OPEC. Organization of Petroleum Exporting Countries

GDP. Gross Domestic Product

PPP. Purchasing Power Parity. World Bank conversion factor. Amount in dollars necessary to purchase in the domestic market of the United States, the quantity of goods and services produced in each country.

Sinopec. China Petrochemical Corporation

PRC. People's Republic of China

RPDC. Democratic People's Republic of Korea

T. Trillion. 1000 billion

EU. European Union

UN. United Nations

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