

The China's Oil and Gas Resources and Safety Countermeasures

Subtitle 3: Chinese Energy Comprehensive Development Strategy and Policy

Project Leader ZHANG Kang

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Introduction

Oil Security

Oil security demands the secure reliable oil supply. At the core of economic stability is ensuring sustainable increases. Oil security means a reliable quantity and price of oil and natural gas that satisfy sustainable economic development demands. Under the situations of quickly increasing of oil and gas input and strength and system unperfected at repartee, the Chinese oil security would face to seriously threaten. However, the unsafe factors and conditions could be digested and dissolved in case of that comprehensive repartee system has been established and improved for ensuring the requirement of economical development.

Key factors affecting Chinese oil security

Unreliability of International oil supply.

- Increased dependence on oil imports results in increased risks to oil and gas supply.
- International oil and gas supply shortages would be appeared internationally in a short time or in some local areas.

2.2 Increasing and decreasing of international petroleum price will be likely happened in a huge degree

- The increased speed of GDP will be slow down in case of that petroleum price is kept higher continuously.
- The production of oil would be decreased and the taxes from petroleum industry must be affected in case of that the oil prices have been kept in a lower level.

2.3 Domestic factors affecting the oil security

- The domestic oil and gas productions have some uncertain. Under the unfavourable conditions, the product amount could be lower than that of predicted quantity. And, if the requirement is obviously higher than what the predicted amount is, the input oil and gas must be increased.
- Effects of natural calamities on the production and transportation should be thought, especially on the transportation of gases.

2.4 The Chinese petroleum companies are experiments shortage of the international strength and managements

The major managers of in either domestic or international markets are huge oil companies, the safety policy will be hardly carried on if the reform and re-construction of the companies have not been processed and their experiments shortage.

2.5 The corresponding system for oil safety is shortage

- The oil and gas storage is extremely shortage
- The forecast mechanisms for petroleum are shortage.

Part One Analyses of Chinese Oil and Gas Resource

1 A general analysis of the Chinese oil and gas resources

1.1 Two characters should be emphasized as;

- China is a great country for oil and gas production, so she has a huge potential for developing petroleum although the exploration plays are much difficult than that of before.
- The oil and gas in China are relatively less than that of international average values (Table 1-1). The petroleum exploration will be obviously much difficult in the next stage.

Table 1-1 The compare of average (person and unit area) resources and resources between Chinese and the world

Type		Oil			Gas		
		China	World	China/world	China	World	China/world
		t/person, t/km ²		%	t/person, t/km ²		%
Yield	Average of person	0.126	0.561	22.5	21.4	399.5	5.36
	Average of per unit area	16.51	25.07	65.9	2806	17848	15.7
remainder recoverable reserves	Average of person	1.98	23.46	8.4	1197.9	24968.8	4.8
	Average of per unit area	260.2	1040.3	25.0	157.93	1116317	14.1
Resources	Average of person	9.22	76.09	12.1	9086.6	70119.1	12.9
	Average of per unit area	1209.4	3399.5	35.6	119.2*	348.6*	38.6

* the unit is $10 \times 10^4 \text{tm}^3/\text{km}^2$

1.2 The industry of gases should be vigorously and carefully developed

- The Chinese industry of gases are likely to be quickly developed

In our calculate program, taking the production in 2000 (the gas product is $270 \times 10^8 \text{m}^3$) as a base, the products in 2010 could be increase by 267%, the average increasing speed in each year in this episode is up to 10.3% that is higher than the expected GDP increasing speed of in same time. The average increasing speed is 3.85% in case of that the products in 2020 could be up to $1050 \times 10^8 \text{m}^3$, which is obviously higher than the international product of gases. So, gases would be a more important role than what is its position at the movement in the Chinese economical development. However, the conditions are hardly to be meet recently, the calculated value might be too higher.

- The general resources of gases in China is less than oils

According to the specialists' calculated average value, the oil resource is $132.5 \times 10^8 \text{t}$, and the gases are $9.66 \times 10^{12} \text{m}^3$, and the gases could be 72.9% of the oils as calculated by equivalent. The higher prices of gases could be a stronger restricted condition for marketing in China and it should be paid much attention for searching the dissolution program accord with the Chinese actual situation.

2 The reserves^① change of oil and gas

2.1 The relative stable trend of the oil and gas reserves

Since 1985, the Chinese oil products have been undergone a “high-low-high” change. The peak value is in 1988, 24.6×10^8 t; the valley point is in 1995, 22.3×10^8 t; a new peak value is in 2000, 24.6×10^8 t and a valley point appeared in 2002, 23.8×10^8 t. Comparing the double peaks, the products in 2000 are 104.25% of that of in 1988. The products in 2002 is 100.8% of that in 1988. It is clearly that the Chinese oil reserves are basically at a “revenue expenditure and a little surplus” situation. However, the qualities of residual reserves and new increased products are all changeable, the reserves should be “revenue expenditure and a little shortage” in an economical and workable evaluations.

2.2 The regionally changes of reserves

The regionally change of reserves is obviously based on the distribution of reserves. As a major petroleum production basement, the reserves in eastern China are about 20.61×10^8 t of in 1985 and never over 20×10^8 t since then. About 3.75×10^8 t had been decreased in 2000 in a 15 episode. The reserves in 2000 are 81.8% of that of year 1985 (Table 1-2). The reserves in western China has been increase by a big margin, for which is mainly from Zhugaer Basin, Tarim Basin and Tu-Ha Basin. In the off shore, the increasing trend is much higher than that if western China. About 99.2% reserves in central China is from Ordos Basin.

Table 1-2 The reserves change in major regions of China in 1985-2000

Region	1985	2000	change quantity	2000/1985 (%)
East China	206128.4	168586.8	-37541.6	81.79
Central China	4758.2	15696.8	10938	329.88
Western China	21608	15696.2	18246.8	184.44
Off shore	580.5	39854.8	20821	3686.74
All China	233174.1	245697.2	12523.1	105.37

unit of the reserves: 10^4 t

2.3 A fast reserves increasing of non-associated gases

In 1990, the reserves of gas in gas zone is 2419×10^{12} m³, and it increases up to 13504.5×10^{12} m³, and 18642.4×10^{12} m³, in 2002. The average increase ratio in the 12 years is 18.55%, in which the ratio in 2002 is about 7.7 times of that in 1990. The ratio of reserves and gas yield is increased from 23.4 in 1990 to 80.0 in 2002. Comparing with the ratio of oils, the distribution of gases is relatively balanced development.

① It means the international “reserves” as the “residual workable reserves” in China and the same below.

3 The Chinese input amounts of oil and gas

3.1 The change of Chinese oil production

• In eastern China, the remainder reserves and recoverable reserves are decreased generally and the yield and reserve in northwest China are lift slower than that of predicted in last ten years.

The yield of oil and gas in northwest China is a little bit higher than the decline of oil and gas in the east China. Generally, the increased yield in China is nearly equal to the increased products in the areas of Chinese off shore (Table 1-3).

Table 1-3 The yield change in each major oil province and all country in 1990-2001

Region	1990		2001		Average in 11years		2001	
	10 ⁴ t	%	10 ⁴ t	%	Yearly increase radio /%	Yearly increase account/10 ⁴ t	Degree of recovery (%)	Reserves Production ratio
Eastern	12634	91.6	11112.9	70.5	-1.16	-138.3	66.8	16.6
Central	203.6	1.5	621.7	3.9	10.73	38.0	26.3	33.0
Northwest	830.6	6.0	2103.8	13.3	8.82	115.7	43.5	21.3
Off shore	126.6	0.9	1853.9	11.7	27.63	157.0	38.6	12.1
All country	13795.3	100	15782.2	100	1.23	180.6	61.2	15.3

- In the area off shore, as a major oil product company before, the eastern South China Sea (belongs to the Shengzheng Oil Company of China National Ocean Oil Corporation (CNOOC)) has been dropped from the peak of production. The peak is 1297.3×10^4 t in 1997 and dropped down to 1104.1×10^4 t. Since the extremely low reserves-production ratio (it is only 2.5 in 2002), the production must be decreased continuously. The production in western South China Sea (Zhanjiang Oil Company) is a little bit increased but less effects on the production in whole country. The production in Tianjin Oil Company (in Baohai) is increased real quickly (Table 1-4) and the increasing trend is likely to be kept going. Therefore, the product increasing in whole country will be affected by the development in Baohai.

- The yield of oil in China is increased slowly in recent 10 years, the average annual increased radio is 1.66%, and the products in 2000 is about 117.8% of that in 1990. According to the change tendency of reserves and yields, it is calculated by the author that the yield will reach to $(1.75 \sim 1.8) \times 10^8$ t around the year of 2010, then the yield will decrease slowly.

3.2 The change of Chinese gas production

The yield of natural gases in China has been increased quickly from 188.8×10^8 m³ in 1990 to 320.5×10^8 m³ in 2002, with an average increased spend of 5.43%, which is lower than that of GDP but obviously higher than that of oil (1.34%).

The increase of gas yield is affected by many factors, however, it will be kept increasing, for which the predicted average increasing speed will be up to 5.81% during 2002 to 2020. The gas yield during 2010 in 2020 is likely to be $700 \sim 740 \times 10^8$ m³ and 1050×10^8 m³, respectively.

Table 1-4 The oil products and change of residual workable reserves in Chinese off shore and major petroleum provinces from 1990 to 2000

Off shore	1990		1995		1997		2000		1990~1995 annual average increased product	1995~1997 annual average increased product	1997~2000 annual average increased product
	yield	Residual work-able re-serves	yield	Residual work-able reserves	yield	Residual work-able re-serves	yield	Residual work-able re-serves			
Tian-jin	86.5	3288.4	190.0	6249.5	210.1	11036.3	351.4	14978.1	20.7	10.1	28.13
Sheng-zhen	13.9	7294.2	582.7	6636.3	1297.3	2210.4	1164.3	3236.7	113.8	357.3	-44.33
Zhan-Jiang	26.2	-26.2	94.6	1648.7	117.0	1463.7	213.7	2863.8	13.7	11.2	32.33
Total	126.6	11056.4	867.3	21401.5	1624.4	15136.1	1777.8	20501.5	148.1	378.6	51.1

Note: the products in East Sea is not list; the data in 1990-1997 is from Gong Zai-sheng; others are from annual yield report and calculated by the author; the unit of the yield and reserves in the table is 10⁴t.

4 The analysis and predicted on the input

4.1 The standing of oil input in Chinese foreign trade

The oil radio change of the export and amount of money about the export and the total amount of the oils since 1980 suggests that the export crude oil and products in total export is less than 6.88% since 1990 and less than 1.7% since 1998 (Table 1-5). The crude oil and products inputs amount and money are both increased with the economical development. However, the radio of oil and products inputs in the total Chinese input amount is decreased. For example, comparing the radio between 2002 and 1997, about 0.81% was reduced.

Table 1-5 The radio of the oil input amount in Chinese total volume of trade

Time/ year	Total volume of trade/a hundred million \$				Radio in the total volume of trade		
	foreign trade	Crude oil	Oil products	Total	Crude oil	Oil products	Total
1980	200.17	1.03	-	1.03	0.51	0	0.51
1990	533.20	4.24	6.10	1034	0.79	1.14	1.94
1995	1320.78	23.56	20.65	44.21	1.78	1.56	3.35
2000	225.094	148.61	36.57	185.18	6.6	1.62	8.22
2001	2436.1	116.72	37.67	154.39	4.79	1.55	6.33
2002	2959.75*	127.61	38.02	165.63	4.32	1.29	5.61

* The data are calculated by the author and others are from "Chinese Economical Annual Returns" and Chinese Annual Statistics Year Book.

4.1 The predict of Chinese oil input

The insufficiency between the yield and predicted requirement is just the theory pure input

amount of oil and gas. So the author present here for two programs about the prediction. In the No.1 program (Table 1-6), a relative lower requirement volume has been used because it is clearly that the environmental protection must be thought under the conditions of the construct of energies and economized energies and oils could be a higher standard, especially, to economize oil and energies would be play an important role during 2010~2020.

Table 1-6 A possible planning of input amount oil and gas in China in the beginning of 21 century (Program I)

Item	Oil		Gas	
	2010	2020	2010	2020
Yield amount/ 10^8 t, 10^8 m ³	1.75	1.65	700~740	1050
Demand amount/ 10^8 t, 10^8 m ³	3.20	3.70	950	1600
Input amount/ 10^8 t, 10^8 m ³	1.45	2.05	210~250	55.0
Input dependence degree/%	45.3	55.4	22.1~26.3	34.4

Since the wide change scale between yield and requirement, especially the yields in year pf 2015 and 2020 are hardly to be calculated, the program II has been presented in 2002 (Table 1-7). It could be used as on simultaneously program with the program.

Table 1-7 A planning about input and requirement of oil and gas in China (Program II)

Time/year	Oil				Gas			
	2005	2010	2015	2020	2005	2010	2015	2020
Yield amount/ 10^8 t, 10^8 m ³	1.75	1.85	1.9	1.8	525	850	1300	1550
Demand amount/ 10^8 t, 10^8 m ³	2.7	3.2	3.6	4.4	600	1000	1500	2000
Insufficiency between input and requirement	0.95	1.35	1.7	2.2	75	150	200	450
Input dependence degree/%	35.2	42.2	47.2	55.0	12.5	15.0	13.3	22.5

Part Two The Situation about China's Oil security

1 The situation of petroleum supplying and demand in the world

1.2 The relative safety episode in the early 21-century

- The yield and remainder recoverable reserves in the world will be gently increased in the 21-century, and the remainder recoverable reserves will be increased in an average ratio of each year during the beginning 20 years. The ratio of reserve and recovered will be kept over 40.

- Since the late of 80's, in general, the petroleum production is under a limited situation in the world. OPEC has used an overall plan of limited yield and safeguards the prices of oil and gas. Other petroleum production countries as former Soviet Union have to decrease the oil and gas yield since some political questions and problems.

- The reserves in the world could be able to be double in 30 years (up to the year of 2050). In the world's reserves of oil and gas, the reserves that is to be discovered are up to 28.1% and the increased reserves of discovered oil and gas are up to 21.8%, both of them are 49.9%.

- Before 2020, the oil yield will be increased, and then the position of oil in the primary energies will be down lower since other kind energies' effects on petroleum, the "Episode after petroleum" could be the ages of manifold energies

- In general, the amount of demand and supplying oil and gas is kept at a balance situation and in a safety environment, which will be able to the world demand and does in China.

1.2 The development of gases will be top all that of oils in the early 21-century

- The potential of gas in the reserve of world is higher than that of oil
- The increased speed of production of gas is faster than that of oil, for which the ratio of reserve and production of gas (60.7) is higher than that of oil (40.6) in 2002.

- The planning and progressing of transformation by using pipeline in a long distance scale and the total cost of LNG has been decreased in a big margin, the gas should be greatly developed and the equivalent of its yield amount will be close and even over that of oil.

- The supply of gas will be much abundant than that of oil and the international commercial will be greatly developed.

2 The characters of modern international oil market

2.1 Oil becomes the commodity

As a maturity of the international market, the meaning of oil as strategy goods becomes weaker and on the other face, it looks much like an important commodity. The management of oil and gas is affected and controlled by the regulars of market economy. There are 90 days' equivalent input petroleum reserve and collective supporting and integrated forewarn system in the major petroleum consume countries (mainly OECD countries), so even some oil export countries united for "contraband" it is hardly to be successful, however, the "contraband" will heavily hurt the economy and society of those oil export countries.

2.2 A new situation between the oil input and oil consume countries appeared

It is difficult that either OPEC or OECD controls singly and dominate exclusively oil and gas

market in a long term.

2.3 The relationship between supply and demand becomes complex

- The non-OPEC countries play a more and more important role in the oil and gas export, specially, the Russia, the Norway, Mexico and some west African countries.
- More hot exploration points and input countries are appeared, especially in Asia.

2.4 The international oil companies play an important role in the controlling of international oil markets

- The private ownership of oil companies affects every oil supply and input countries in a different degree and level.
- In a way of merge into an organic whole including upstream and downstream and many kinds connection and purchase, many major oil input and export countries have developed some huge international petroleum companies.
- In the background of development of an organic whole, the connected international oil companies and consortium become an important force for controlling the international petroleum markets (Table 2-1).

Table 2-1 The major statistics about the biggest oil companies in the world

Type		Oil reserves 10 ⁸ t	Gas Reserves 10 ⁸ m ³	Oil yield 10 ⁴ t	Gas yield 10 ⁸ m ³	Refined Ability 10 ⁴ t/a	Product Sell amount 10 ⁴ t/a
OPEC national company	quantity	1014.4	623351	129675	3507	55495	56415
	%	73.2	42.8	40.2	14.9	13.2	19.6
Other national oil company	quantity	164.3	429010	75180	7681	60421	44170
	%	11.9	29.4	23.3	32.7	14.8	15.3
Super oil Company	quantity	71.2	62104	59966	4069	102265	159440
	%	5.1	4.3	18.6	17.3	25.1	55.3
Private oil Company	quantity	24.8	11451	14045	828	24185	28405
	%	1.8	0.8	4.3	3.6	59.3	9.8
Total 50 biggest oil Company	quantity	1274.7	1125916	278866	16085	242366	288430
	%	92.0	77.3	86.4	68.5	59.4	100.0
Total of the world	quantity	1385.9	1456377	322760	23484	404450	※

Note: The original data are from Weekly Oil Information, U.S.A. and have been classified and statistics by the author.

3 The international prices of oil market

3.1 The price of oils is a kind of monopoly price

- The prices of oil and relative gas have been higher than that of their monopolize cost all along. This is a big difference with other kinds goods and is why the petroleum industry, special

the upstream is higher risk and repay.

- In a long term, the top price of oil is controlled by the cost of replace energies that will be reduced continuously in 21 century because of the developing of sciences and technologies. And, the price is also limited by the needs of environment protection.

- OPEC and other oil export countries more and more understand the negative effects of too higher oil prices, for which will decrease economical development and needs for oils and increased oil production from some countries out of OPEC will reduce their markets.

3.2 The oil prices will be kept relative stable in a middle and long term

For the average oil price in a long term, it is stable in case of that they have been calculated in a non-changed U. S. dollar; however, it will be a little bit lifting in case of calculated in a changeable U.S. dollar. Taking the case in year of 2000 as an example, the average price in a long-term will likely increase from 23\$/per barrel up to 25\$/per barrel.

3.3 The cyclical fluctuation of oil prices

- Every kind of factors would cause the change of oil prices left the average value. The change could be enlarged by speculative process and psychological factors,

- The biggest and most important factor on the international oil prices should be the shifts of economic increasing, changing of local supplying and demand and some suddenly effects, so the predicting on the oil price in a shot term would be real difficult.

- The analysis on the oil prices between 1986 and 1993 shows that the price could be a mixture of many cycles, affected by different ranks factors (Table 2-2).

Table 2-2 The classification and comparing between cyclic fluctuation ranks of oil prices from July 1986 to December 1993

Time	Mouth	Sub-cycles	Changed price/U.S.\$/barrel	Biggest price difference/ U.S.\$/barrel
1986.7-1988.10	27	3	10.3-21.3-12.6	11.0
1988.10-1990.6	20	2	12.6-20-14.1	7.4
1990.6-1992.1	19	2	14.1-34-16.5	19.9
1992.1-1993.12	23	2	16.5-20.5-11.5	9

Note: The price is the monthly average oil price calculated depending to OPEC price.

4 The geopolitics and management of the Chinese oil and gas

4.1 The characters of geopolitics of Chinese oil and gas

- China is a country facing the seas with the continent behind.
- China has latent unsafely factors for including military-geopolitics etc.
- China is a quickly developing and pure oil input country.
- China is located in the oil-shortage central area of East Asia.
- China is far away from the major oil export sources.
- China has some new bases of oil input.

4.2 The international management policy according to the geo-petroleum characters

- To strengthen actual strength and effects in all fields in different ways in the international oil markets.

- It should be to progressively search and develop more areas and regions of oil input, in which the oil input countries should be Middle East and Russia, pipeline for gas input should be the Asia parts of Russia, and the LNG input, Southeast Asia, Australia and Middle East.

- Competition and alliance should flexible integrated.

This method and policy should be used for the relationship between countries, companies, and no matter huge or small projects. The development will be processed in a double win way.

4.3 The relationship between China and oil and gas in Northeast Asia

There are rare best integrations among international oil market of Northeast Asia.

- The Asia area of Russia has abundant oil and gas resource and developing potential.
- China, Japan and South Korea are the most attractive oil and gas input countries.
- There are stronger financial supporting in this region.
- China has the technological advanced resources on both petroleum downstream and upstream systems.

It is sure that Russia must surmount a difficulty and complete the transform of market economy system and become maturity on this field. China should strategically accelerate the cooperation in the region.

4.4 The relationship between China and the oil and gas in Northeast Asia

- The areas around the Caspian Sea and Central Asia will be the most practical export region besides Middle East.

- The oil and gas export in this area should be west-forward in a geo-political idea.

- There are huge market potential including petroleum exploration and development and oil refinery, so China had better to play a positive role in this field.

- The oil and gas in Central Asia are hardly to be transformed into East Asia in a long distance and huge amount.

4.5 The relationship between China and oil and gas in Southeast Asia and South Pacific areas

- As Indonesia becomes a pure oil input country and acute increasing of Chinese oil and gas input, the oil and gas input in this area will been being kept increased, and becomes the most important oil input region with Japan and South Korea .

- LNG has a real important position in this area (Table 2-3). The LNG export becomes a very important role in the international market, such as from some islands countries and Australia to eastern part of Asia.

- Singapore plays an important role in the world petroleum industry and international market. China should pay attention to the effects of the country during the developing and moving to the world.

Table 2-3 The increasing of major LNG export countries of Southeast Asia and South Pacific

Country	1973	1977	1980	1983	1990	Average yearly increase in 1980-1990	1998	Average yearly increase in 1980-1990
Brunei	15	74	74.9	70.4	72.0	0.39	81.3	1.53
Indonesia		7.0	114.8	128.2	276.0	9.17	360.6	3.4
Malaysia				14.8	86.0		193.9	10.7
Australia					39.0		99.0	12.35

From Cedigaz, author calculate the average yearly increase, the unit is 10^8m^3 .

4.6 The relationship between China and oil and gas in Middle East

- The Middle East will be still the most important oil and gas input source even in the episode of 2020-2030 depending to the reserves and productions there. So China should take the management in Middle East as the first position of strategy.

- There are some big differences within the Middle East, even from any field. So, to pay attentions on the differences and to tread in different way and process from our benefit ways should be the important management tactics in this area. According to the production and export amount, the Middle East countries are real important (Table 2-4), especially, Saudi Arabia and Iraq and Iran have strategy spaces for our developing and managing.

Table 2-4 Yield, consume and export of oil and gas in major oil production countries in Middle East

Country	Residual recoverable reserves			Yield		Consume		Export	
	10^8t	%(position in a name list)	Reserves/yield	10^6t	%(position in a name list)	10^6t	%(position in a name list)	10^6t	%(position in a name list)②
Saudi Arabia	360	38.5(1)	85	422.9	39.3(1)	62.7	30.4(1)	319.52	31.3(3)
Iraq	152	16.3(2)	>100	117.9	10.9(3)	22.8	10.7(3)	26.58	7.5(4)
Kuwait	133	14.2(3)	>100	104.2	9.7(5)	10.5	5.1(5)	59.51	5.8(5)
United Arab Emirates	130	13.9(4)	>100	113.2	10.5(4)	14.3	6.9(4)	101.95	10.0(3)
Iran	123	13.2(5)	67.4	182.9	17.0(2)	54.2	26.3(2)	125.60	12.3(2)
Total	898		86.8	941.1	87.5	164.5 ①	79.7	683.16	67.0

Note: The export data is from 1998 and other data are from 2001: ①All of the data about Iraq's are based on that of 1998, so the consume could be referenced; ② the export amount means the radio with total of OPEC.

- The oil and gas in Middle East have big potential (Table 2-5). Petroleum exploration and development, LNG and GTL and long distance pipeline all have huge developing space. The

Middle East, specially Qatar are likely to export LNG to China.

Table 2-5 The changes of reserves, yield and consume of the major gas product countries and Middle East

Country/ Area	Residual reserves/ 10 ¹² m ³	1990-2001 increased reserves/%	Reserves/ Yield in 2001	yield in 2001, 10 ⁸ m ³	1990-2001 increased yield/%	Consume In 2001/ 10 ⁸ m ³	1990-2001 increased consume /%
Iran	23.00	3.07	>100	606	8.91	650	11.09
Qatar	14.40	12.11	>100	325	15.64	160	7.73
Saudi Arabia	6.22	1.75	>100	537	4.31	537	4.31
United Arab Emirates	6.01	0.64	>100	413	5.67	343	5.33
Iraq	3.11	1.46	>100	76	7.41	29.5	3.85
Kuwait	1.49	0.84	>100	95	34.24	95	34.24
Middle East	55.91	4.12	>100	2280	8.12	2015	7.47

Note :the data about Iraq are from “*Journal of Oil and Gas*”

5 The effects of the war of Iraq on the Chinese oil and gas

5.1 United States’ effects on the management of Iraq oils

Based on some historical experiences, the United States is very unlikely occupied the Iraq long time. The new government of Iraq with close relationship if west world will strongly affect the policy of its oil and gas input, for which it is possibly to have benefits from some “legal ways”.

5.2 The resume and development of Iraq oil will support enough oil for international market

The Iraq will back to its highest history record (170 million tons in 1979), for which the Iraq will add 40~70 million tons input amount higher than that of before the war. In case of that the country will be able to get a stable and benefit atmosphere, the input oil will be able to be added 150~250 million tons more than that of before the war in 2010~2015. Generally speaking, this situation will be good and benefit for the Chinese petroleum and chemistry industries.

Overall thinking:

- According to the foreigner comments, China used a “typical energy countermeasure” that has absorbed and learned many other countries’ experiments.
- All useful and practical experiments should be learned and digested for forming the suitable countermeasure system of China’s oil safety.

1 To generate a reasonable structure of energy and save the energies and oil

1.1 To form the Chinese energy strategy

The Chinese energy strategy should be a high efficient way including taking the reduce energies as the first position, and giving the first place to coal and using varied energies.

- The Chinese have to take the first place to coal for varied energies and coal could be used clearly and high efficiently.
- Oil, gas and primary electronic power can not independently be a major energy, so varied energies should be mutually used.
- Chinese has a real differences in each area, so it needs to be energetically developed.

1.2. To give the energies save the first place

• Both structure and technological energies save should be emphasis, and the structure energies save should be paid more attention before 2010 and then the technological energies save.

- The replace of oil should be paid attention and it needs to be energetically developed.
- The energies supporting in some remote provinces should be improved, especially for new energies as biotic energies.
- The development of new energies should follow the international trending and to try the best to reach some technological tops of new energies consume.
- To take the energies save and environment protection as a basic national policy.

2 To strengthen the petroleum exploration and development within China

2.1 To deepening reform of the petroleum industry system

• For the country’ management, the laws about Chinese oil and gas markets have to be macroscopically constructed, managed, controlled and perfected and the matured market mechanism should be generated and developed.

• The reform of oil companies must be deepened and the strong and powerful international oil companies should be constructed.

2.2 To increase invest for the upstream of petroleum industry

• In the late 20th Century, Chinese has not paid enough invest to upstream, especially petroleum exploration. The invest in 1986-1990 on the exploration was 57.5% only in the planning, and in 1991-1995, 81.7% only (Table 3-1). The long term invest shortage caused a continue dropped down of exploration and Chinese petroleum industry faced to a harsh situation in late 20th Century.

Table 3-1 Chinese petroleum upstream working statistics in 1991-1995

Item	Demand job (yearly average)	Completed job (yearly average)	Completed/demand(%)
Invest for exploration/ 100 million BMB	125.8	102.8	81.72
Drill/10 ⁴ m	294.8	241	81.75
Well number	1253	996	79.49
Used reserves	4.13	3.596	87.06
Identified energies/ 10 ⁴ m	845	734.7	86.95

- To increase invest for the upstream of petroleum industry is an international management

The invest focus has been transformed to upstream of petroleum industry on the world since later of 80's because of the higher repay from this field.

Every huge oil company should invest on the upstream specially, the petroleum exploration. And the government should manage the invests for some basic and early stages of petroleum geological researches and generate good conditions for new play areas.

2.3 To process practical and useful local developing strategy for petroleum provinces

- Chinese petroleum industry should pay attention on lithological traps exploration and improving recovery in the east China, and strength the plays in Tarim, Zhungar and Ordos Basin, northwest China, expand new play areas off shore, and prepare the new play areas in South China Sea and Tibet.

- The gas exploration should be much attention in the central part of China ,such as Sichuan and Ordos Basin, and to develop the west and off shore. Construction of pipelines and under ground gas store should be processed by using some gas traps in eastern China.

2.4 To pay much attention on the developing of petroleum sciences and technology

- The basic researches about petroleum geologies have been improved and developed.
- To petroleum sciences and technology should be improved by studying any technological fields. Based on 3I (intelligence, Information and Integration), petroleum sciences and technology could be improved.

- The Chinese petroleum system should be formed and improved.

On the upper-stream, a completed system about low permeability and low pressure reservoirs exploration and development should be formed for identifying and protecting and reforming some special oil and gas layers and developing efficiently.

- The Chinese petroleum system includes petroleum sciences and technology and researches and studies system composite of nation and companies and institutes, which will be transformed into a marketing system gradually. In this way, the invest for petroleum system will become various since the basic researches results will be presented and serviced directly to practical plays.

3. To all-round enter the international oil markets

3.1 To become the activity part of the international markets

- To take the markets as a major way for getting oil and oil products and work hard for dealing in future and marketing, and to take the share oils from the areas out of country as an important play and way.

- The Chinese oil companies must to be a real international companies and to all-round develop international oil markets under the financial managing and controlling, including both upstream and downstream projects and try to get jointing-invest petroleum exploration blocks and stock-holding for those and to purchase and annex oil and gas fields, pipelines and chemical factories etc.

- To develop deal in future markets in home, for the purpose of getting more right to speaking on the oil price, as we are one of the biggest oil exporters on the world.

- To construct more kinds of commercial alliance and manage the markets in more flexible ways.

- To improve the basic installations and facilities of both input and export oil

3.2 To construct national unified pipelines and oil and gas reservoirs, for which the oil input and export must be thought both.

- To improve input ports, basement of reservoirs and to construct single invest or joint owner oil and gas fleets.

- To achieve diversify oil input in a broadly speaking

3.3 To adjust export oil and oil products and increase oil products' export.

- The oil products input should be from more countries, including crude oil, oil products, LNP and LPG, and so do on the input contracts.

- China has paid attention on this problem since 90's. However, right now the oil input from Middle East is still up to 50% of total input amount (Table 3-2). For way of oil and gas input, Chinese did better that of Japan but obviously fall behind that of United States.

Table 3-2 Chinese oil input sources since 1995

Input source		1995	1996	1997	1998	1999	2000	2001	2002
Middle East	10 ⁴ t	776	1196	1678	1667	1690	3765	3385	3340
	%	45.4	52.9	47.3	51.0	46.2	53.6	56.2	49.6
Asia Pacific	10 ⁴ t	709	822	941	494	683	1061	868	1185
	%	41.5	36.3	26.5	18.1	18.7	15.1	14.4	11.4
Africa	10 ⁴ t	184	193	591	219	725	1682	1355	1580
	%	10.8	8.5	16.7	8.0	19.8	23.9	22.5	24.3
Others	10 ⁴ t	40	51	337	300	563	505	418	737
	%	2.3	2.3	9.5	11.0	15.4	7.2	6.9	11.4
Total		1709	2262	3547	2680	3661	7013	6026	6941

		100	100	100	100	100	100	100	100
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3.4 To try getting more supporting from the national policies.

- This will be benefit for using and connecting with international marketing laws and all-round enter the markets.

4. Progressively construct and improve the reserve and forewarn system of oil and gas

4.1 Reserve system

- The reserve is a traditional safety way for preventing heavy calamities, suddenly affairs, and a good adjustment for oil supplying.

- The different kinds and dispositions of tactics and strategy reserve system should be constructed. The 40 day's demand should be established before 2010, and 55 day's demand should be constructed before 2020. According to the authors' predicting that means 90 day and 120 day' demand in those year, respectively.

- A reference program for constructing reserves is presented (Table 3-3), and some professional organs have been established for the studies and process.

- To construct reserve oilfields and to take a special discussions on this project.

- To pay attention on the gas's safety and to improve national pipeline web and undersurface reserve storages.

- Chinese has corrected the mistake as pay attention in pipeline but none of undersurface gas storage constructing and present some primary program (Table 3-4).

Table 3-3 A possible program about Chinese oil reserve in 205-2020

Year	Consume/ 10 ⁴ t	Input/10 ⁴ t	No.1 Program/10 ⁴ t(day)			No.2 Program/day
			Government reserve	Company reserve	Total	
2005	27023	10246	1000 (14)	1600 (21)	2600 (35)	92
2010	32878	15332	2000 (22)	2500 (28)	4500 (50)	107

Table 3-4 The Chinese undersurface gas storage for pipeline

	Daqing Oilfield	Liaohu Oilfield	Huabei Oilfield	Dagang Oilfield	Jiangsu Oilfield	Henan Oilfield	Jiangnan Oilfield	Total	
Shanxi- Beijing			4						4
Jingbian- Shanghai						6	6		6
Xinjiang-						6			12

Shanghai									
Zhongxian- Wuhan								4	4
Sakhalin	10	8							18
Irkutsk		5	4	5	5				19
West Siberian						15	15	5	35
Total	10	13	8	5	5	27	21	9	98

Note: the unit is 10^8m^3

4.2 Forewarn system

- “Soft prevent” is very important that is an important inspiration from SARS.

• To progressively improve the forewarn mechanism and the corresponding planning should be proposal and implement. Here we suggest 5 degrees of forewarn programs, in which the oil and gas shortage is up to the input amount as 3%, 5%, 7%, 10% and 15%, respectively. The base of forewarn is to construct selection and analysis mechanism of either home and foreigner information.

- To establish relative laws for the petroleum forewarn system.

In conclusion, the unsafely factors about oil and gas can be weaken and decreased by using the comprehensive methods. Thing should be like what our Chinese idiom said, “Where there is precaution, there is no danger”.