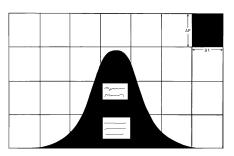
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M. KING HUBBERT CENTER FOR PETROLEUM SUPPLY STUDIES

M. KING HUBBERT CENTER Petroleum Engineering Department COLORADO SCHOOL OF MINES GOLDEN CO 80401-1887

PETROLEUM POSITIONS OF EX-USSR AND CHINA

by L. F. Ivanhoe

These two huge nations made up the main pre-1990 Communist Block. Today their economic doctrines are much more like "open-market economies" than anyone would have imagined in 1990. But the jury is still out on how liberal their future governments may be. The dramatic changes in oil production and consumption of these two giant nations since 1983 should be a warning to the world's oil consumers.

Ex-USSR (Figure 1)

The former Soviet Union (FSU/CIS/Ex-USSR) has broken up into 15 individual countries. Only Russia is a relatively self-sufficient entity in terms of energy and mineral resources. Few of the other 14 low resource, low populations, ethnic countries are self-sufficient in the critical oil and gas, minerals, etc. that are needed for a modern economy. (Table 1) Most of their needs and infrastructures were integrated with those of the rest of the USSR for maximum USSR central planning efficiency, rather than each nation/area producing what it consumed. As a result, all are still dependent to some degree on Russia – especially for their refined petroleum products.

Russia is by far the largest (80 percent of USSR area) of the 15 nations that now make up the "Ex-USSR" (also called the Former Soviet Union (FSU)). Inasmuch as old statistics were shown as "USSR" without further breakdown, most data-banks/lists still include an "Ex-USSR" category for the users' convenience.

Table 1 lists the 1994 breakdown of the 15 Ex-USSR states and China and their oil statistics.

HC#98/3-1-1 July 1998

Oil Production

Figure 1 shows the oil production cycle of a country in its "declining" phase. The Ex-USSR's total crude oil and NGL (natural gas liquids) production dropped from 12.5 million barrels per day (MMB/D) in 1983 to 7.2 MMB/D in 1995. It is suggested that the USSR's first production peak in 1983 was the "Hubbert Peak", while the second peak (12.6 MMB/D) in 1987 represented a "maximum-effort peak" resulting from an all-out attempt to reverse the nation's first production decline. A symmetrical "Hubbert Curve" ("A") drawn as a mirror image of the ascending production curve from 1950-1983 through the 1983 peak would intersect the declining production curve at 1996 and continue downward to about 5.5 MMB/D in the year 2000, and to 2.0 MMB/D in 2010. Of course any production from new (Caspian Sea, Sakhalin Island, & other) fields and enhanced oil recovery (EOR) techniques will accordingly increase the Ex-USSR's total annual and ultimate production after 1995. This is shown schematically as a "bump" ("B") on the right-hand side of the indicated simple Hubbert Curve "A". (It is quite possible that most nations' production curves will show a similar "maximum-effort peak" a few years after the local "Hubbert Peak" occurs, e.g. USA production bump in 1985.)

Oil Consumption

The USSR's oil consumption increased steadily from 3.7 MMB/D in 1950 to a peak of 9.1 MMB/D in 1981. Consumption then declined slowly to 8.7 MMB/D in 1989, whereupon it dropped precipitously to 4.3 MMB/D in 1995 – leaving 2.9 MMB/D for 1995 exports. The Ex-USSR now uses only 50 percent of the oil consumed in 1989, the Russian government taking all it can for exports. (By comparison, the USA now consumes twice its production – the missing barrels all being imported.)

Oil Exports

In 1994, the Ex-USSR was still the world's number two exporter of crude oil (Saudi Arabia was #1).⁴ Exports of crude oil and gas are a principal source of hard currency for the Ex-USSR. Unless foreign capital and oil companies can bring forth new oil fields/production soon, the Ex-USSR's citizens will have a hard time existing without adequate supplies of crude oil. It will be a tight race between the public's private requirements and the government's need for hard currency derived from crude oil.

CHINA (Figure 2)

Oil Production

Figure 2 shows the oil production of China, a country in its initial "ascending" production phase – in sharp contrast to the "declining" phase of the Ex-USSR: (Figure 1). (Note that the vertical production scale of Ex-USSR/Figure 1 is 5 times that of China/Figure 2.)

China's first significant oil discovery was the giant Daqing field complex in northeast China (Manchuria). It was discovered in 1959, one year after all Soviet oil explorationists had returned to the USSR due to one of the USSR/China spats. Figure 2 notes several significant Chinese historical events since 1930. Mao Tse Tung (Mao Zedong) fought his civil war with no indigenous oil supply. (The gasoline for his few motor vehicles during the "Long March" was carried by his walking troops on shoulder yokes-each carrying two 5 gallon cans of gasoline plus their packs and rifles. An amazing example of what some humans can do in emergencies!)

The Daqing field was not brought onto production until 1969, after which date oil production steadily increased. By 1972, China was temporarily self sufficient in oil (at a low level) and from 1973-1992 a surplus was exported. It was after China became self-sufficient in oil that the U.S. president Nixon was welcomed to come to China in 1972.

China has odd geology and is not "super-oily" like the Persian Gulf region, as was originally hoped for. If China's oil fields were easy to find, (like Saudi Arabia's) the Chinese would already have found the largest fields with even crude technologies. The Soviets had studied and rated the onshore basins before they departed in 1958. In 1976, after Mao Tse Tung died, foreign oil companies were invited to explore in the South China Sea from the Vietnam border to Taiwan. A major effort was made offshore in the early 1980's by oil companies from all countries using the most modern seismic methods. But only a few commercial oil fields and no giant fields (e.g.: ultimate production =500MMB) were found on this broad continental shelf. The Bohai Bay area southeast of Beijing is China's most prolific offshore area.

China is so large (about the same as the USA) that oil basins and small fields are widely separated with few pipelines outside the local producing areas. An abundance of coal is the main fuel supply. The far-western basins are closer to the Ex-USSR Muslim nations of Kasakhstan and Kyrgyzstan than they are (3000 km) to Beijing.

Oil Consumption

China's oil consumption increased from 0.3 MMB/D in 1968 to 3.1 MMB/D in 1994, when production was 2.9 MMB/D. When Hong Kong was absorbed by China in July 1997, it added 5 percent more of refined products to China's consumption. The US/DOE estimates China's consumption will reach 4.4 MMB/D in year the 2000 and 6.7 MMB/D in 2010, while production will level off at a little more than 3.0 MMB/D through year the 2015. China is now discussing financing and building a pipeline from Kazakhstan's Caspian Sea fields east to the Bohai Sea. This suggests that the Chinese no longer believe that China will ever be a "super-oily" nation (as in the Persian Gulf).

Oil Imports

China has more than 1.2 billion people and one of the highest densities of bicycle ownership in the world.⁵ Trips by walking and bicycle constitute 70 to 80 percent of the total passenger trips in China's major cities. However, there are signs that China is about to dismantle this bicycle and rail-dominated transportation system in favor of a more "modern" system based on the private automobile and truck. China has begun removing bicycle lanes along highways and city streets. The economic planning ministry announced that it wants every family in China to eventually have a car; (When? At 3 persons/family they will need some 400 million cars to reach the goal! The USA has 200 million vehicles.) The private car fleet in China grew by 172 percent between 1990 and 1991 alone. Auto sales are projected to quadruple by the year 2000 to nearly 1.6 million vehicles annually. Motorcycle use is growing even faster. China hopes to have 22 million cars by the year 2020, up from 10 million vehicles (trucks, buses, cars, etc.) in 1995.⁶

China will have to import a lot of crude oil and products to meet its goals. They hope/plan to import oil from Russia's Far Eastern Sakhalin Island fields in the Sea of Okhotsk and elsewhere. The Chinese will use the US dollars received in payment for their USA trade balance to purchase oil on the international market, and if they lack dollars, the resourceful Chinese can be expected to barter.

China will be a formidable competitor to the rest of the world for global oil after the year 2010 (Figure 2).

Selected References

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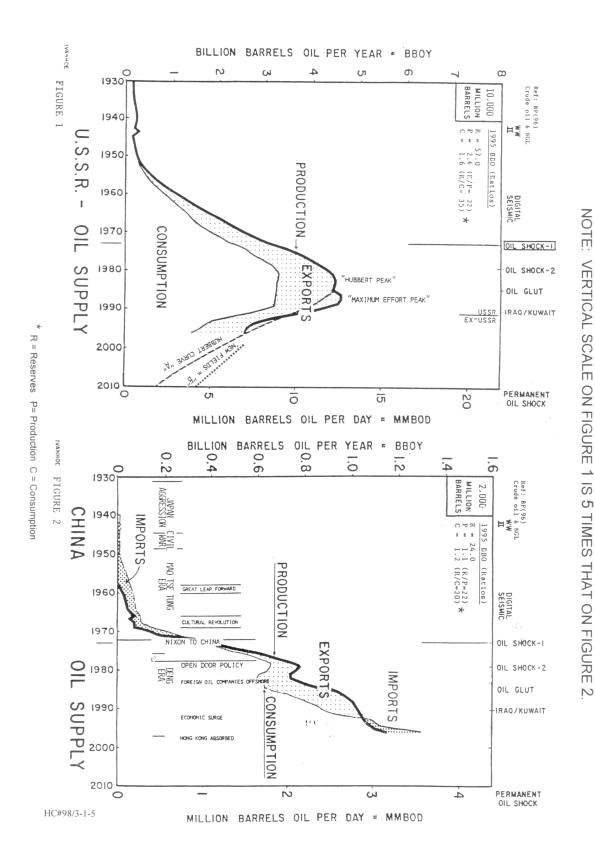
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TABLE 1 World Petroleum Supply and Disposition, 1994

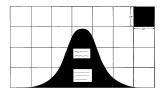
(Thousand Barrels per Day)

	Primary Supply			Disposition			Bunkers	
			Total Imports		Total Exports	Apparent		Distillate
		Crude	of Refined		of Refined	Consumption		Fuel Oil
	Oil	Oil	Petroleum	Crude Oil	Petroleum	(Including	Residual	and Other
Former U.S.S.R.	Production ¹	Imports	Products	Exports	Products	Bunkers) ²	Fuel Oil	Products
Armenia	0	0	7	0	0	7	0	0
Azerbaijan	192	41	(s)	18	31	187	0	0
Belarus	40	222	14	5	18	260	0	0
Estonia	0	0	25	0	0	25	2	1
Georgia	2	2	2	0	0	6	0	0
Kazakstan	415	93	29	188	30	304	0	0
Kyrgyzstan	2	0	7	2	0	7	0	0
Latvia	0	0	41	0	(s)	40	0	0
Lithuania	3	88	35	0	47	78	0	0
Moldova	0	0	22	0	0	22	0	0
Russia	6,335	232	44	2,490	942	3,179	230	0
Tajikistan	1	0	7	1	0	7	0	0
Turkmenistan	85	10	2	1	30	63	0	0
Ukraine	85	334	82	(s)	5	495	0	0
Uzbekistan	115	60	16	20	5	168	0	0
Sub Total	7,275	1,082	333	2,723	1,108	4,848	232	1
China	2,939	252	366	371	99	3,141	45	12

Reference: DOE/EIA-0219(95)

Note: Sum of components may not equal total due to independent rounding.

H.C. NEWSLETTER



The M. KING HUBBERT CENTER FOR PETROLEUM SUPPLY STUDIES located in the Department of Petroleum Engineering Colorado School of Mines Golden, Colorado

The Hubbert Center has been established as a non-profit organization for the purpose of assembling and studying data concerning global petroleum supplies and disseminating such information to the public.

The question of WHEN worldwide oil demand will exceed global oil supply is stubbornly ignored. The world's oil problems, timing and ramifications can be debated and realistic plans made only if the question is publicly addressed. A growing number of informed US and European evaluations put this crisis as close as the years 2000 - 2014. The formation of this center is to encourage a multi-field research approach to this subject.

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¹Oil production includes crude oil, natural gas plant liquids, other liquids, and refinery processing gains.

²Apparent consumption includes internal consumption, refinery fuel and loss, and bunkering. Also included, where available, are liquefied petroleum gases sold directly from natural gas processing plants for fuel or chemical uses. (s)=Value less than 500 barrels per day.