

M. KING HUBBERT CENTER FOR PETROLEUM SUPPLY STUDIES

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PETROLEUM POSITIONS OF THE UNITED KINGDOM AND NORWAY WESTERN EUROPE

L. F. Ivanhoe

North Sea Oil

The United Kingdom (UK) and Norway are the most significant petroleum producing nations of Western Europe, (Table 1). Virtually all of the oil and gas produced by these two nations comes from North Sea waters – one of the world’s 25 major petroleum provinces.⁴ Many of these offshore fields, including numerous “giants” (i.e. ultimate production more than 0.5 billions barrels of oil) were discovered by the then-new “digital” (electronic) seismic methods in the late 1960s. However, actual production was delayed until new open-sea petroleum engineering technologies were developed that allowed economic operations in these deep and stormy seas. All of the previously discovered giant oil fields came on stream in the mid-1970s after global oil prices had been steadily increased after 1973 by the Organization of Petroleum Exporting Countries (OPEC). This oil price increase justified the huge investments needed to develop the new open-water technologies required to produce the already discovered offshore oil fields. Economists commonly confuse the date of a field’s discovery and the date when it was put on production. Many of the new offshore drilling and production techniques were “born” off California and Texas, but “grew up” in the North Sea. North Sea technologies for drilling, producing, and transporting oil were soon being used around the globe. The North Sea was the last “major oil province” (i.e. 7 to 25 billion barrels oil ultimate production) discovered in the world.⁴

Effective petroleum exploration of the world’s marine areas had to await the 1960s development of new electronic “digital” seismic methods that could acquire usable data below the air/water interface and other geological barriers which made the older “analog” seismic methods ineffective offshore. By the end of the 1960s, oil company geophysicists had conducted reconnaissance digital seismic surveys over most of the shallow-water continental shelves of the Western (non-Communist) world. The peak of global oil discoveries occurred in 1962, but many of these fields did not produce oil until the last half of the 1970s.

Approximately 91 giant oil fields were discovered, mostly offshore, around the world in the 1960s, including 35 in the non-OPEC nations.⁵ When developed, these giants broke OPEC's monopoly and high prices, and resulted in a global "oil glut" (price collapse) by 1986. As the years went by, marine technologies were gradually improved to economically produce the oil in smaller fields and in "deep waters" (more than 1000 meters), thereby extending the effective life of the overall North Sea production into the early 2000s, after which peak the fields will inexorably decline in the normal fashion.

United Kingdom (Figure 1)

The UK (57 million people) is one of the four largest nations of Western Europe. As a result of its sizable population, the country consumes most of the oil produced in its own fields. Most European nations produce only a small amount of oil, virtually all from onshore fields. Onshore Europe is not particularly "oily" and virtually everybody was pleasantly surprised with the ultimate number and sizes of fields in the previously unknown North Sea oil province.

Figure 1 shows how the North Sea oil discoveries changed the British economy, from "coal-based" to "oil based" during the late 1970s oil production surge. Before 1980 the UK imported virtually all of its oil, but after 1980 they had a surplus to export. This changed the nation's economics and politics, while the coal miners' unions lost their power. National budgets expanded.

The conspicuous dip in UK oil production between 1988 and 1994 was the result of the 6 July 1988 fire which destroyed Occidental Petroleum's Alpha platform on the Piper field. That disaster also curtailed production temporarily from near-by fields that tied into the Piper pipeline. The Piper field finally went back on production in 1993 and regained full capacity in 1994.

The Conservative Prime Minister Margaret Thatcher's policies (1979 to 1990) floated on a sea of new oil. She was removed as her party's leader after oil exports declined briefly in 1989. Her successor John Major (1990 to 1997) served while exports were again surging. In 1997, the Labor party took over. One wonders what will happen politically when the UK oil production next declines after the year 2000?

Norway (Figure 2) Norway's onshore geology consists of non-oily "Scandinavian Shield" basement rocks. Consequently, all of Norway's oil production comes from its offshore waters of the North Sea and Norwegian Sea. Several "giant" oil fields were found during the 1960s in Norway's prolific North Sea sedimentary basin, from which production began in the early 1970s (Figure 2), and has increased steadily to date.

Norway has a small population of four million people. Consequently, the nation uses only a small portion of its oil production with the rest left over for exports. The steady increase in exports has enriched Norway's small number of citizens, and the excess capital has been conservatively utilized by the state. Norway's oil consumption has remained steady during

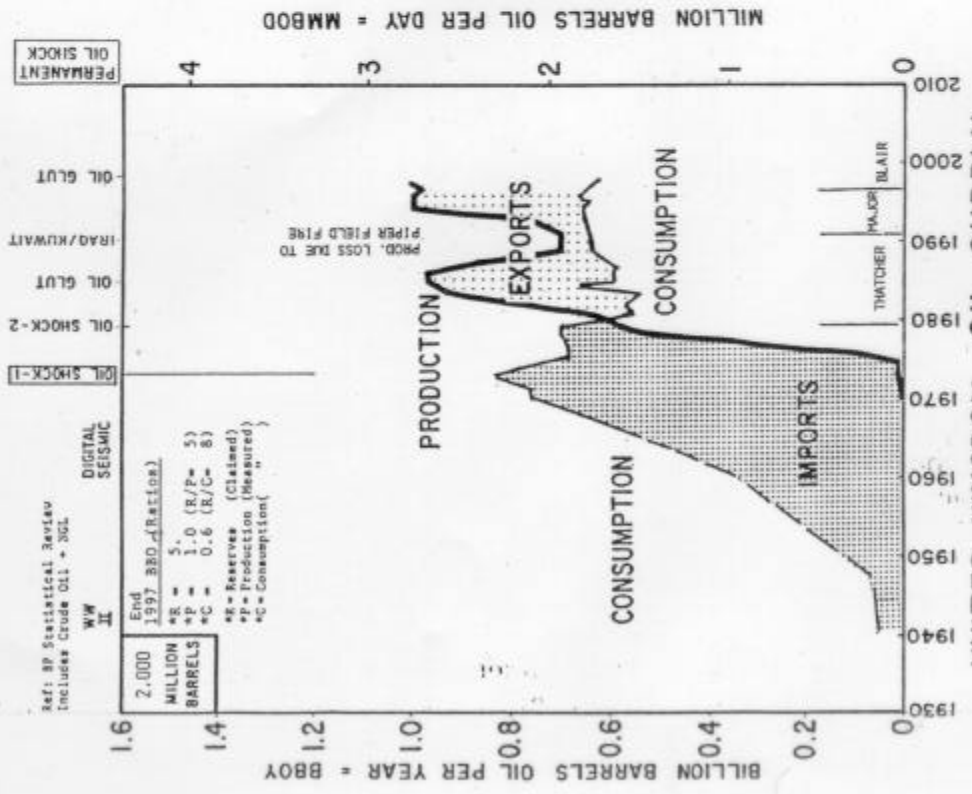


FIGURE 1

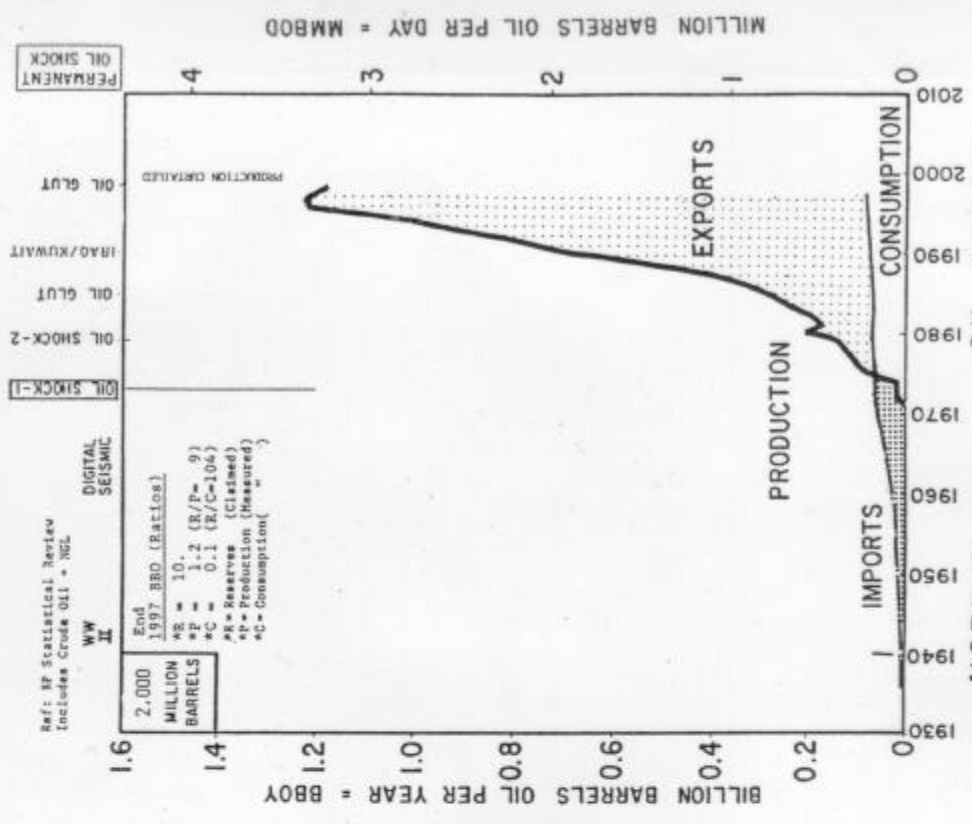


FIGURE 2

the last ten years. The state decided to cooperate with OPEC and topped off its petroleum exports during the 1998 period of low global oil prices – inasmuch as the Norwegians already have all of the income needed to maintain their high standard of living and social benefits. Leaving Norwegian oil in the ground for future needs now seems to be a better policy than to have even more money in the bank. Norway now expects to reach the peak of its offshore oil production in 2006, with a rapid decline after 2010.

Table 1: World Petroleum Supply and Disposition, 1996
Western Europe

This table is taken directly from the U. S. Department of Energy report: International Energy Annual – DOE/EIA-0219(97), Apr. 1999. This compilation combines data from several sources to present the oil production/consumption/imports/exports of each of the listed nations. The table is always a couple of years late due to the complexity of assembling and analyzing the various data into one table. It is included here to allow direct comparison between the several factors for each of the nations of the table or other Hubbert Center newsletters. The key nations mentioned in this newsletter are underlined.

Table 1 World Petroleum Supply and Disposition, 1996
(Thousand Barrels per Day)

Region/Country	Primary Supply			Disposition			Bunkers	
	Oil Production ¹	Crude Oil Imports	Total Imports of Refined Petroleum Products	Crude Oil Exports	Total Exports of Refined Petroleum Products	Apparent ² Consumption (Including Bunkers)	Residual Fuel Oil	Distillate Fuel Oil and Other Products
Western Europe								
Austria	24	156	81	1	23	232	0	0
Belgium	12	652	347	0	426	564	70	14
Bosnia and Herzegovina	0	0	18	0	0	18	0	0
Croatia	36	82	8	6	39	78	5	2
Denmark	212	117	116	110	95	238	15	14
Finland	0	186	93	0	99	193	4	2
France	98	1,708	414	5	384	1,935	43	7
Germany	134	2,136	981	35	289	2,911	25	14
Greece	12	354	93	5	92	368	42	16
Iceland	0	0	15	0	0	16	0	0
Ireland	1	46	93	0	16	126	5	5
Italy	166	1,514	654	2	376	2,058	32	13
Luxembourg	0	0	39	0	0	38	0	0
Macedonia, TFYR	0	16	14	0	1	29	0	0
Netherlands	115	1,157	835	15	1,213	771	168	45
Norway	3,245	24	67	2,963	278	216	6	6
Portugal	2	232	89	0	47	277	4	3
Serbia and Montenegro	22	26	4	0	0	49	0	1
Slovenia	5	9	48	0	1	54	0	0
Spain	28	1,095	255	0	167	1,175	63	24
Sweden	4	402	195	0	192	398	16	4
Switzerland	1	110	162	0	13	275	0	5
Turkey	71	454	176	0	31	633	1	2
United Kingdom	2,872	886	349	1,453	621	1,845	26	24
Other	0	0	27	5	0	27	14	4
Total	7,056	11,363	5,173	4,590	4,402	14,525	528	196

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

² Apparent 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.

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

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L.F. (Buzz) Ivanhoe, Petroleum Consultant, Ojai, California, is a registered geologist, geophysicist, engineer and oceanographer with 50 years domestic and international experience in petroleum exploration with various private and government oil companies. He is a very practical oilman. He was associated with Occidental Petroleum from 1968 to 1980 where he was senior advisor of worldwide evaluations of petroleum basins from 1974 to 1980. On leaving Oxy, he moved to Santa Barbara and formed Novum Corp., an international energy exploration consulting firm. Now located in Ojai, Mr. Ivanhoe is the author of numerous papers on various technical subjects, including some 60 on the evaluation of foreign prospective basins and projections of future global oil supplies. He is the coordinator of the Colorado School of Mines - M. King Hubbert Center for Petroleum Supply Studies.

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OIL RESERVE REVISIONS: MAJOR OPEC AND COMMUNIST COUNTRIES
1979 to 1999

L. F. Ivanhoe

Proven oil reserves claimed by many governments cannot be trusted. OPEC (Organization of Petroleum Exporting Countries) and Communist/Former Soviet Union (FSU) governments are predictably unreliable in reporting “oil reserves” due to political, rather than technical considerations. There is no way to audit sovereign governments’ claims.

The tabulation summarizes the annual “Worldwide Oil and Gas Reserves” as reported in each year-end issue of the Oil & Gas Journal (O&GJ). These data are also the basis for the “Proven Reserves” in the British Petroleum Company annual “BP Statistical Review of World Energy”. In spite of the weaknesses in the O&GJ/BP reserve numbers, they are what are publically available and are commonly discussed by the general public, including the media, stock brokers, economists, and academics.

Such “Reserves” should be used with considerable skepticism. A cursory review of the 1990 to 1999 data reveals that there were no significant changes in the annually claimed oil reserves (COR) of the five Persian Gulf OPEC “Giants” (Saudi Arabia, Kuwait, Iraq, Iran, UEA) and in the two “Communist Giants” (USSR/FSU and China). However, during the same 1990 to 1999 decade, these nations produced 105 Bbo (Billion barrels of oil) which were not accounted for (deducted from) their “Proven Reserves”. These same seven nations claim 79 percent of the world’s oil reserves and produced 42 percent of the world’s oil in 1998. It is apparent that these published “Proven Reserves” of the seven major oil producing nations are meaningless for purposes of critical studies and projections of their future oil production, which must be determined from other data, (unpublished files, etc.) At best, the COR of the OPEC countries indicate their agreed-upon order-of-magnitude of each country’s “reserves”, which define the “OPEC pecking order” as used to help establish the various OPEC nations’ oil production quotas.

During the 1980s the various OPEC nations all showed sudden increases in their “Proven Reserves” that were not justified by new drilling/discoveries. These abrupt reserve increases between 1986 and 1987 apparently resulted after Venezuela began producing some of their previously unproducibile “Orinoco heavy oil” by using new petroleum engineering technologies – after which Venezuela appropriately increased their COR. The other OPEC nations followed by increasing their CORs, without further justification, to reestablish OPEC’s previously agreed-upon political “pecking order” to reset their OPEC production quotas. Clearly these quotas are based on “political reserves” rather than on the careful calculation of petroleum reservoir engineers.

CLAIMED OIL RESERVES

OPEC & FSU & CHINA

Ref: Oil & Gas Journal (annual year-end Dec. issue = same as annual BP Statistical Review)

Year End OPEC	OPEC: PERSIAN GULF					S. AMERICA	COMMUNIST		(underline = signifi
	Saudi Arabia	Kuwait	Iraq	Iran	U.A.E.	Venezuela OPEC	USSR/FSU COMM	China COMM	
1979	163.4	65.4	31.0	58.0	29.4	17.9	67.0	20.0	Iran revolution. Iraq-Sadc
Oil price serge = oil shock #									
1980	165.6	64.9	30.0	57.5	35.1	18.0	63.0	20.5	Iraq/Iran War (1980 to 1988
1981	164.6	64.5	<u>29.7</u>	57.0	37.4	20.3	63.0	19.9	
1982	162.4	64.2	41.0	55.3	32.3	21.5	63.0	19.5	
1983	166.0	<u>63.9</u>	43.0	51.0	32.3	24.8	63.0	19.1	
1984	169.0	90.0	44.5	48.5	36.5	25.8	63.0	19.1	
1985	168.8	89.9	44.1	47.9	33.0	25.6	61.0	18.4	
1986	166.6	91.9	<u>47.1</u>	<u>48.8</u>	<u>33.0</u>	<u>25.0</u>	59.0	18.4	Saudis open oil wells. Oil gl
1987	167.0	91.9	100.0	92.9	98.1	56.3	59.0	18.4	Abrupt OPEC political reser
1988	<u>170.0</u>	<u>91.9</u>	100.0	92.9	98.1	58.1	58.5	<u>23.6</u>	Iraq/Iran war ends
1989	255.0	94.5	100.0	92.9	98.1	58.5	<u>58.4</u>	24.0	
1990	257.5	94.5	100.0	92.9	98.1	59.0	57.0	24.0	Iraq invades Kuwait. Oil pri
1991	257.8	94.0	100.0	92.9	98.1	59.1	57.0	24.0	US/Iraq War; Kuwait wells t
1992	257.8	94.0	100.0	92.9	98.1	62.6	57.0	24.0	UN/Iraq oil embargo. Two
1993	258.7	94.0	100.0	<u>92.9</u>	98.1	63.3	57.0	24.0	China again imports oil
1994	258.7	94.0	100.0	89.2	<u>98.1</u>	64.5	57.0	24.0	
1995	258.7	94.0	<u>100.0</u>	88.2	97.8	64.5	57.0	24.0	
1996	259.0	94.0	112.0	93.0	97.8	64.9	57.0	24.0	
1997	259.0	94.0	112.5	93.0	97.8	71.7	57.0	24.0	
1998	259.0	94.0	112.5	89.7	97.8	72.6	57.0	24.0	Oil glut - Low oil prices
1999	261.0	94.0	112.5	89.7	97.8	72.6	57.0	24.0	Russia pres. Yeltsin resigns
Oil price serge.									
2000									

The Oilman's Column #4- by L. F. Ivanhoe

GROCERIES AND GASOLINE – TWO WEEKS' SUPPLIES!

Our American standard of living is in very delicate balance, depending on the ready availability of vehicle fuels. Even a short interruption of petroleum supplies could quickly become disastrous. This can be illustrated with two familiar examples: our daily dependency on the supermarket, and on the gasoline service stations.

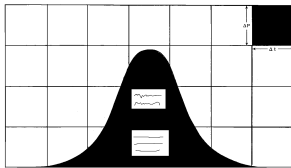
It is not generally realized that urban supermarkets average only TWO WEEKS' supplies on their shelves. For some commodities such as bread, delivery is almost daily. Gasoline service stations' underground tanks are designed to hold TWO WEEKS' supply of gasoline and diesel fuel. The big diesel-fueled trucks which keep our grocery stores stocked, normally deliver their orders every night from central warehouses. This delivery process is so efficient that the trucks are generally not noticed.

TWO WEEKS' inventory is the efficient economic limit for such large-volume businesses. If the delivery trucks should stop running for any reason, grocery stores' shelves and the service stations would be effectively emptied of their basic supplies within TWO WEEKS. A steady stream of petroleum fuels is now vital to our existence. All governments should plan ahead on how to dictate priorities for any emergency use of vehicle fuels.

Our way-of-life cannot hold its breath longer than TWO WEEKS. Research, development, and distribution of any alternative vehicle fuels will also be subject to the TWO WEEKS supply limit.

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H.C. NEWSLETTER



The M. KING HUBBERT CENTER FOR PETROLEUM SUPPLY STUDIES

located in the Department of Petroleum Engineering
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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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