

OPEC's Next Challenge – Rethinking their Quota System

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Background

Probably for the first time in its 42 year history, OPEC has gained the respect of the world oil community as a *technically* competent organization. An organization capable of managing the fundamentals of the oil market, managing global stocks and movements, refinery throughputs etc., to “achieve stable oil prices which are fair and reasonable for oil producers and consumers”, as stated in their primary mission. Following the last price crash of 1998 when oil prices hit a low of \$10 per barrel, OPEC put into place a price band mechanism with the object to maintain their basket price of seven crude oils within a \$22 - \$28 per barrel range by fine-tuning daily output at their discretion.

Since January 2001, OPEC has been very successful in keeping their basket price within the target range (see Fig. 1), the exception being the six-month period following the wake of September 11. During that time they allowed prices to fall to a low of \$16 per barrel. They cited market stability as more important than their price target as the reason for not cutting production to boost prices during that period. As a recent example of their disposition to keep prices in line, when crude oil prices began climbing through the upper limit of the band at the end of September 2002, OPEC increased production by 760,000 barrels per day. By the end of October, crude prices had fallen more than 10 percent, returning to their target range. Since the beginning of January 2002, OPEC has increased their crude oil production by 2.4 million barrels per day (mnbpd) to the current production level of 25.0 mnbpd in the 4th Quarter of 2002. OPEC accounts for roughly 40 percent of the world's crude oil production and about 77 percent of its proven reserves. In the context of this paper, crude oil is used as the basis for production and reserves data. OPEC uses crude oil, which does not include condensates, natural gas liquids (NGL's) and oil from non-conventional sources, as its reference for quotas and ceilings.

How does OPEC handle production cutbacks and increases? Their first attempt to stabilize prices by controlling production came in March 1982 amidst falling prices following a severe contraction in world demand during the period 1980-86. They agreed upon a ceiling of 18 mnbpd, slightly higher than the then production level of 17.4 mnbpd. They also agreed upon quotas for each member country and set the ceiling for a three-month period. The procedure failed many times during the next four years. The price of oil continued its free fall to below \$10 per barrel in the summer of 1986, mainly because various members would produce beyond their quotas.

Over the years, the quota system has essentially never worked. On the one hand, OPEC has no way to enforce compliance by its members with the agreed-upon quotas and, on the other, there were always members dissatisfied with their assigned quotas. Production generally exceeded the ceiling (see Fig. 2) and, in many cases, the excess has been very significant. In its September 2002 meeting, OPEC agreed to stay firm on their ceiling of 21.7 mnbpd of crude oil (excluding Iraq) set last March when in reality current output is running almost 2 mnbpd higher. This curtailed production simply should be reallocated among the member countries. Because of its large production capacity, Saudi Arabia has been the swing producer ever since the quota system was put in place 20 years ago.

The original 1982 quotas were revised several times and were finally suspended in 1986. Following the 1990-91 Gulf Crisis, OPEC coaxed the quota system in an attempt to accommodate rising Kuwaiti output following its recovery from the destruction of its oil facilities during the war. OPEC finally convened in an extraordinary session on September 1993 to revise the country allocations. They made major adjustments to bring everybody in line with their then current output capacity. Qatar, Venezuela, Saudi Arabia and Iran received substantial quota increases (see Table 1); all others were adjusted downwards. A new production ceiling was agreed upon, now for a six-month period. Those quota allocations, based on compromises within the framework of a pro rata method proportional to historical production levels, remain in place today. The period of continuous negotiations following the Kuwaiti crisis was traumatic for the organization and they never re-addressed the problem. After almost 10 years, the then agreed-upon quotas obviously do not reflect the present production capacities of OPEC's members.

Classical proration methods, as practiced in the USA and Canada, are based on *verifiable* well tests and reserves. They work principally because the Regulatory bodies can legally impose compliance. For instance, during the Great Depression (1931-32), rulings of the Texas Railroad Commission regulating oil production in East Texas were being ignored. Then Governor, Ross Sterling, placed several counties under martial law and shut down oil production temporarily.

Obviously, analogous actions are not applicable to sovereign countries but neither does quota busting or a boom-bust cycle of oil revenues serve their purpose. OPEC revenues topped \$600 billion in 1980, fell to little over \$100 billion in 1998, and should close 2002 at roughly \$180 billion (Energy Information Administration, EIA).

Times have changed in OPEC's favor. In the world energy outlook for the next decade or two, demand will outstrip supply if timely and substantial new discoveries are not made (see Fig. 3). This implies that a revised quota system would have to address the important issue of rewarding discoveries. Constant production caps only handcuff oil companies with investments in OPEC countries and discourage the much needed large foreign investments required to expand output capacity.

Proposed Formula for Allocations

In 1986, OPEC conducted an in-depth analysis of their system of allocating quotas with the view to set up a durable formula, equitable to all members. They defined eight criteria, falling into two categories: oil related and socio-economic. The factors considered were:

Reserves	Population
Production capacity	Dependence on oil exports
Historical production share	External debt
Domestic oil consumption	
Production costs	

It is of interest to see some of their views on what they considered the negative features of the different criteria¹. In regard to reserves, many of the countries consider them as state secrets; new discoveries, they claim, could have a sudden and major impact on equity distribution; production capacity favors the countries rich enough to maintain excess capacity; historical production share tends to make producers boost production in times of high demand; domestic oil consumption figures may be difficult to obtain; uniform treatment of production costs is difficult; countries with large populations may be assigned quotas in excess of their ability to produce; dependence on oil revenues will give similar quotas to everyone (see Oil GDP's, Table 1); and compensations for external debt would imply approval for financial mismanagement. These dilemmas proved too overwhelming to handle and the quota system remained unresolved up to today.

Two important conclusions can be derived from the above observations. In the first place, the complex socio-economic differences between the member countries suggest that these parameters be excluded from any allocation formula. Secondly, all of the members of OPEC agreed that production capacity provides a practical upper limit on a country's quota. This is fortunate because all bona fide proration systems use pool production potential, or, correlatively, country potential in the OPEC context, as the basis for production allocation. They also provide incentives for exploration, secondary recovery operations and for pools with low reserves per acre, via bonus allowables. Rate control is the centerpiece parameter of these systems since proration is fundamentally waste prevention oriented – control of infill drilling, of wells with high gas-oil ratios, accelerated reservoir pressure depletion, etc. These fundamental conservation constraints are equally valid for OPEC since oil is the backbone of their economy.

Production Capacity. OPEC's crude oil production capacity has grown 14 percent in the last two decades and currently stands at 29 mnbpd, roughly 40 percent of the total world capacity. All member countries, with the exception of Indonesia and Venezuela, have registered moderate to insignificant gains in their crude oil production capacity during the last five years. Indonesia and Venezuela have suffered declines of 200,000 bpd (15 percent) and 500,000 bpd (17 percent), respectively, while the capacities of Libya, Qatar

¹ An excellent discussion of the deliberations is given in: OPEC Issues, Center for Global Energy Studies, London, 1999.

and the United Arab Emirates (UAE) have essentially remained unchanged, over the same five-year period. Table 2 summarizes the evolution of crude oil production potential of OPEC's member countries over the last 22 years. The data shows a remarkably high level of consistency. Country production capacity data is obtained through surveys conducted by several well-known international agencies and therefore can provide a reliable starting point for evaluating allocation formulas.

Reserves. Another important oil related factor that could be considered in an allocation formula would be proven reserves. However, reserves figures from OPEC member countries (see Table 3) reflect a bumpy trend. During the 1980's, OPEC proven crude oil reserves increased by 80 percent. Many of the countries upped their 'book' reserves, in some cases (Iraq, UAE, Venezuela) by a factor of three, to position themselves in anticipation of a quota system. As a consequence of these accounting practices, most of the countries with large reserves, notably, Iran, Iraq, Kuwait, Saudi Arabia, UAE and Venezuela, share an abnormally high reserves/production ratio – reflected in the slopes of the correlations in Fig. 4. The ratio is well out of line with other major oil producing nations such as Mexico, Norway, Russia, UK, USA, just to name a few. It should therefore come as no surprise that because of these manipulations over the years, the reserves parameter, as such, has lost its usefulness for any quota system. What is more critical, perhaps, is that these anomalies limit severely the entrance of other oil exporting countries into the OPEC fold.

New Discoveries. The only remaining oil related variable of importance to the OPEC quota system is new discoveries. It is fundamental to incorporate incentives for foreign investments in exploration and development. The Middle East is, at this time, the most important oil region capable of making significant contributions to the forthcoming oil supply deficit, when world production peaks² sometime in the next decade or two.

During the period 1997 – 2001, there have been discoveries of new oil and gas fields in some thirty countries around the world, with an average size find of 295 million barrels of oil equivalent proven reserves. The range in size of the finds varies from less than 20 million barrels in countries like Ghana, Colombia, Germany, etc. to 1,900 million barrels in Kazakhstan. In the case of OPEC, nine member countries (see Table 4) registered new discoveries, ranging in size from 1,130 million barrels in Iran to 40 million barrels in Algeria. The average OPEC find contained 275 million barrels of equivalent oil.

In order to tie new discoveries into an allocation formula, it is necessary to establish a suitable relationship between reserves and field productivities. As pointed out previously, the differences between the correlations of the reserves/production potential data for the OPEC and non OPEC countries are significant. A comparison of the slopes of the trend lines in Fig. 4, indicates that OPEC reports almost five times the reserves required to sustain the same output level. In this study, we use the correlation of the non OPEC countries since it is more consistent with well documented average productivities of new

² Hubbert's Peak, Deffeyes, Kenneth S., Princeton University Press, 2001.

field discoveries both in the Middle East and in other regions^{3,4}. Moreover, it would assign more favorable allocations to all of the OPEC member countries.

From Fig. 4, the derived relationship between discoveries and production potential is:

$$Q_{\text{omax}} = 180 \cdot R \quad (1)$$

where,

Q_{omax} is the theoretical maximum rate potential expressed in barrels of oil per day, and R is the size of the discovery in millions of barrels of proven reserves.

For example, a find with 1 billion barrels of proven oil reserves would generate a production potential of 180,000 barrels per day. However, since this output generally will take five years or more to go on stream⁴, it is highly desirable to give the country an *early* credit for the find, equivalent to 50 percent of the theoretical output, in the year following the discovery and for a duration of 5 years. The remaining 50 percent will be gradually phased into the country's output potential as the field is developed.

This early credit or bonus production, Q_{ob} , is calculated by modifying Equation (1) to the following:

$$Q_{\text{ob}} = 90 \cdot R \quad (2)$$

The General Allocation Formula. OPEC is constantly analyzing short term market demand and crude oil spot prices with the object of controlling their output, to keep their basket price within the price band. These output ceilings, reflecting cutbacks or production increases, are established periodically – monthly or every three months – according to the market fluctuations. The quota system is needed to distribute the output ceiling among the member countries, assigning production aliquots to each member.

The country aliquots are determined by the following algorithm:

$$Q_{Ai} = Q_{capi} \cdot (Q_c - Q_{\text{obt}}) + Q_{\text{obi}} \quad (3)$$

where,

Q_{Ai} is the country aliquot expressed in mnbpd,

Q_{capi} is the basic country quota expressed as a *fraction* of the total OPEC output capacity,

Q_{obi} is the country's bonus quota for new field discoveries, mnbpd

Q_{obt} is the total OPEC bonus quotas, mnbpd,

Q_c is the established production ceiling, mnbpd, and

i is the country index.

³ Global Octane - 2001, Merrill Lynch, Oct. 2002

⁴ Oil Production Capacity Expansion Costs for the Persian Gulf, EIA, Jan. 1996

It should be pointed out that in calculating the basic country allocation: $Q_{capi} \cdot (Q_c - Q_{obt})$ in the above formula, the total bonus quotas are subtracted from the production ceiling. This guarantees that production cutbacks will be distributed equitably among all members. The bonus quotas are subsequently added to each member allocation. This preserves the reward nature of the bonus for successful exploration efforts.

Equation (3) will now be used to analyze two hypothetical cases: a) OPEC sets a production ceiling equivalent to its crude oil production of October 2002, and b) what happens when new members join the organization.

Results and Analysis

By way of illustration, the proposed quota system is applied to the crude oil production situation in OPEC, as of October 2002. The basic quota is calculated using the current output capacity of each member country. Additionally, a bonus allocation is assigned to those countries that had new discoveries in the previous year, using the field productivity Equation (2). In this example, the new discoveries in Table 4 were used to calculate the respective country bonuses which total 222,300 bpd. The total country allocation is the sum of the basic and bonus allocations. The production aliquots are calculated using Equation (3). OPEC's crude oil production of 24.8 mnbpd in October, 2002, was assumed to be the newly set production ceiling.

In synthesis, the results, summarized in Table 5, indicate that five countries are producing above their quotas, and six below. The average deviation from the allowables was 6 percent for the over-producers and 5 percent for the under-producers. It should be recognized that oil wells, as a matter of practicality, may over-produce one day and under-produce the other. Moreover, in the case of secondary recovery projects, frequent rate variations are not desirable from a technical point of view. In typical proration systems, permissive tolerance of overproduction is limited to 125 percent of the allowable for the pool. Such excess production, however, must be compensated for, normally in the following month. At the country level, however, as is the case of OPEC, a reasonable period of reposition may be the following trimester. An Oversight Committee should be charged with monitoring these situations.

What if other exporting countries should join OPEC ? To investigate this hypothesis, the quota system was extended to include four important oil-exporting countries: Angola, Mexico, Norway and Russia. The results of the simulation are shown in Table 6. The new expanded group of fifteen countries has a total crude oil production potential of 43.5 mnbpd, roughly 50 percent higher than OPEC's. The assumed production ceiling is 39 mnbpd, equivalent to the current (October, 2002) crude oil production of the fifteen countries. There are thirteen countries with new field discoveries, with a total bonus of 260,550 bpd. Seven countries are over-producers, averaging 9 percent above their aliquots, and there are eight under-producers averaging 7 percent. These averages are very reasonable.

It is of interest to see how the two groups were affected by the integration. The new group of four countries received a total aliquot of 13.0 mnbd, 1.2mnbd less than their production before integration. The OPEC group was favored by the same amount. This is so because the OPEC group has a much larger spare capacity than the new group and the quota algorithm tends to seek equilibrium among all of the members, shifting allocations from countries with little spare capacity to those with more flexibility. Before integration, the group of four was producing at 98 percent capacity compared with 86 percent for OPEC. The expanded group, after integration, was producing at 90 percent of their total capacity.

Conclusions

OPEC set up their original quota system in 1982, prorating their production ceiling in accordance with each country's output capacity. These initial country quotas were revised several times and finally suspended in 1986. In 1993, following the Iraq/Kuwait crisis, they re-addressed the problem, adjusting the quota distributions to the then upgraded production potentials of the member countries. After almost ten years, these same quotas remain in place today.

The highlights of the proposed quota system is as follows:

- ❖ the backbone of the system is the country crude oil output capacity that can be reached in 30 days and remain sustainable for at least 90 days. These are prorated to generate the basic quota of each member country. It is recommended that each country produce its maximum potential, at least once a year for a duration of thirty days. An Oversight Committee will coordinate the programming of these production potential "tests".
- ❖ Additionally, an *early* bonus allowable is provided for new field discoveries. This bonus, equivalent to 50 percent of the theoretical potential of the reserves discovered, is added to the country's basic output quota in the year following the discovery, and remains in place for five years.
- ❖ The quotas are to be updated annually.

Evidently, the success of this honor system will depend on the will of the member countries to make it work. The lifetime of the system is foreseen to be about twenty years after which there should be no need for quotas as the world demand/supply relationship would begin to tip in favor of demand.

Finally, the simplicity, transparency and efficacy of the proposed quota system should facilitate the decision of other oil exporting countries to join the OPEC organization. This expansion would provide an even more efficient base to keep prices in line for the benefit of all parties, producers and consumers. The events surrounding the current Iraq situation would seem to suggest the convenience of putting in place the proposed quota system in the very near future.

Acknowledgments

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Table 1 Oil GDP's, Crude Oil Production, Spare Capacity and Quotas of Major Oil Exporting Countries						
		Oct 2002⁽²⁾				
Country	Oil GDP⁽¹⁾	Production	Spare Capacity		Quotas⁽³⁾, %	
	%	mnbpd	Kbpd	%	1982 - 1986	1993 - 2002
Algeria	30	0.76	150	16	5.03	2.89
Indonesia	30	1.0	60	5	5.67	4.98
Iran	20	3.5	400	10	11.72	12.99
Iraq	50	2.4	500	17	12.79	8.42
Kuwait	38	1.8	500	22	8.70	7.36
Libya	28	1.3	110	8	5.30	4.94
Nigeria	55	2.0	260	12	7.51	7.32
Qatar	55	0.56	50	7	1.69	2.36
Saudi Arabia	40	7.2	1480	17	24.03	29.68
UAE	26	1.8	490	21	8.91	8.09
Venezuela	30	2.5	0	0	8.54	10.98
SubTotal OPEC	37	24.8	4000	14	100.00	100.00
Angola	42	0.8	0	0		
Mexico	3	3.0	200	6		
Norway	21	3.0	40	1		
Russia	12	7.4	100	1		
Sub Total Others	20	14.2	340	2		
Total	32	39.0	4340	11		

Notes: Oil GDP is the percentage contribution of the oil sector to the country's total GDP. Spare capacity is the level of production that can be reached within 30 days and sustained for 90 days. The 1982 and 1993 quotas were adjusted to exclude Gabon and Ecuador that are no longer members of OPEC. Likewise, in the 1993-2002 quotas, Iraq is included with its allocation prior to the UN embargo. Crude oil excludes condensates, NGL's and oil from non-conventional sources.

Sources: (1) Merrill Lynch; (2) IEA; (3) WTRG *Economics*.

**Table 2 OPEC Crude Oil Production Capacity
1980 – 2002**

Country	1980		1990		1994		1998		2000		2002	
	mnbpd	%	mnbpd	%	Mnbpd	%	mnbpd	%	mnbpd	%	mnbpd	%
Algeria	0.63	2.5	0.75	3.2	0.75	3.0	0.85	3.2	0.85	3.0	0.91	3.2
Indonesia	1.3	5.1	1.3	5.6	1.3	5.2	1.3	4.8	1.1	3.9	1.1	3.8
Iran	1.7	6.7	3.2	13.8	3.6	14.6	3.6	13.2	3.7	13.2	3.9	13.5
Iraq	2.6	10.2	2.1	9.1	0.6	2.4	2.1	7.7	2.6	9.3	2.9	10.0
Kuwait	1.7	6.7	1.2	5.2	2.1	8.5	2.1	7.7	2.1	7.5	2.3	8.0
Libya	1.8	7.1	1.4	6.0	1.4	5.7	1.4	5.1	1.4	5.0	1.4	4.9
Nigeria	2.0	7.9	1.8	7.8	1.9	7.7	2.1	7.7	2.1	7.5	2.3	8.0
Qatar	0.4	1.6	0.4	1.7	0.4	1.6	0.7	2.6	0.7	2.5	0.7	2.4
Saudi Arabia	9.4	37.0	6.5	28.1	7.6	30.9	7.6	28.0	8.4	30.0	8.7	30.0
UAE	1.7	6.7	2.1	9.1	2.3	9.4	2.3	8.5	2.3	8.2	2.3	8.0
Venezuela	2.2	8.7	2.4	10.4	2.6	10.6	3.0	11.0	2.8	10.0	2.5	8.6
Total OPEC	25.4	100.0	23.2	100.0	24.6	100.0	27.1	100.0	28.0	100.0	29.0	100.0
Total World	59.8		60.3		60.0		67.3		68.2		70.2	

Notes: Crude oil excludes condensates, NGL's and oil from non-conventional sources. Year 2002 refers to October.

Sources: EIA; IEA; Merrill Lynch; OPEC Annual Statistics Bulletin; Arab Oil and Gas Directory

Table 3 Proven Crude Oil Reserves of Major Oil Exporting Countries 1980 – 2000 (billions of barrels)				
Country	1980⁽¹⁾	1990⁽¹⁾	1995⁽¹⁾	2000⁽²⁾
Algeria	8	9	10	9
Indonesia	9	10	5	5
Iran	58	93	94	94
Iraq	30	100	100	112
Kuwait	68	96	96	96
Libya	23	23	30	30
Nigeria	17	21	21	24
Qatar	3	3	4	6
Saudi Arabia	168	261	261	263
UAE	30	98	98	98
Venezuela	20	62	66	77
Sub Total OPEC	434	776	785	814
Angola	1	2	2	5
Mexico	44	51	49	28
Norway	6	9	14	10
Russia (3)	63	57	55	49
Sub Total Others	114	119	120	92
Total Exporting Countries	548	895	905	906
World	650	1005	1028	1028

Sources: (1) OPEC Annual Statistical Bulletins; (2) Oil and Gas Journal; (3) Merrill Lynch

**Table 4 Average Size of Oil & Gas Discoveries
in OPEC and other Selected Countries, 1997-2001**

Country	Average Size of Discovery (million barrels of oil equivalent)
Iran	1130
Saudi Arabia	640
Angola	230
Iraq	205
Nigeria	180
Norway	150
Venezuela	90
UAE	65
Libya	65
Indonesia	55
Algeria	40
Russia	25
Mexico	20

Source: IHS Energy Group

Table 5 Proposed Quota System – OPEC, Oct. 2002

Country	Proposed Quotas				Crude Oil Production			
	Output Capacity Qcap		Bonus Qob	Total Allocation	Actual	Aliquot QA	Difference	
	%	mnbpd	bpd	mnbpd	mnbpd	mnbpd	bpd	%
Algeria	3.2	0.91	3,600	0.91	0.76	0.79	-30,000	-4
Indonesia	3.8	1.1	4,950	1.1	1.0	0.94	+60,000	+6
Iran	13.5	3.9	101,700	4.0	3.5	3.42	+80,000	+2
Iraq	10.0	2.9	18,450	2.9	2.4	2.50	-100,000	-4
Kuwait	8.0	2.3	0	2.3	1.8	1.97	-170,000	-9
Libya	4.9	1.4	5,850	1.4	1.3	1.21	+90,000	+7
Nigeria	8.0	2.3	16,200	2.3	2.0	1.98	+20,000	+1
Qatar	2.4	0.7	0	0.70	0.56	0.59	-30,000	-5
Saudi Arabia	30.0	8.7	57,600	8.8	7.2	7.43	-230,000	-3
UAE	8.0	2.3	5,850	2.3	1.8	1.97	-170,000	-9
Venezuela	8.7	2.5	8,100	2.5	2.5	2.15	+350,000	+16
Total OPEC	100.0	29.0	222,300	29.3	24.8	24.8		

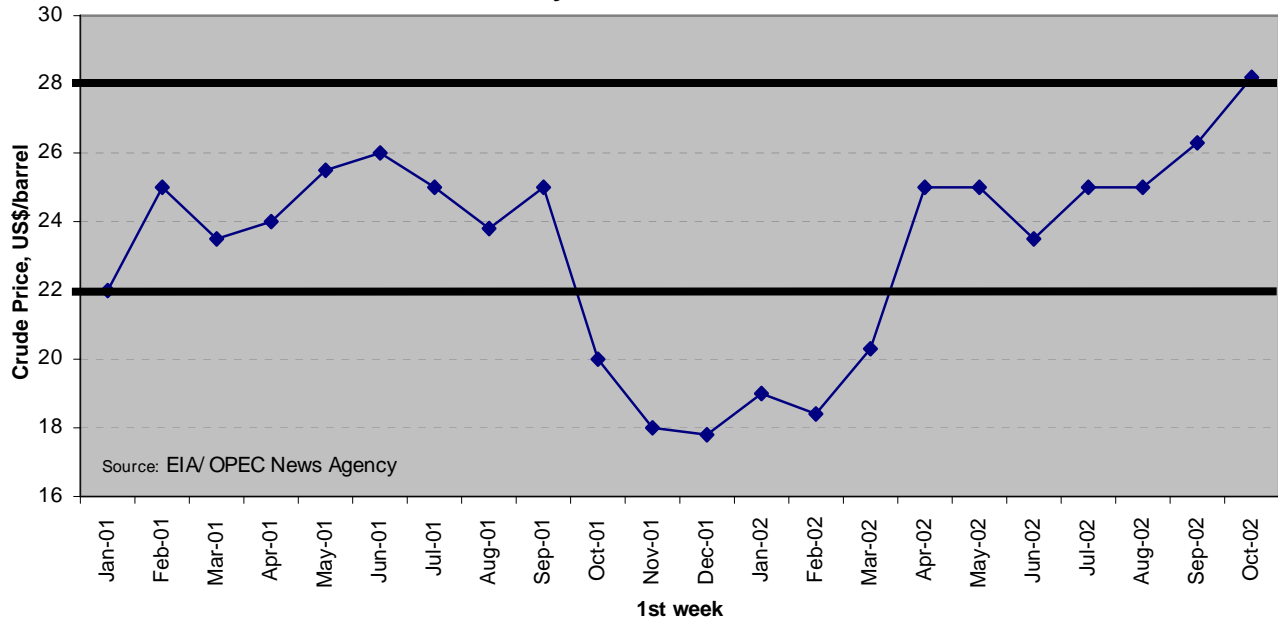
Notes: Output capacity refers to crude oil and does not include condensates, NGL's and oil from non-conventional sources.

Table 6 Proposed Quota System – OPEC and Other Countries, Oct. 2002

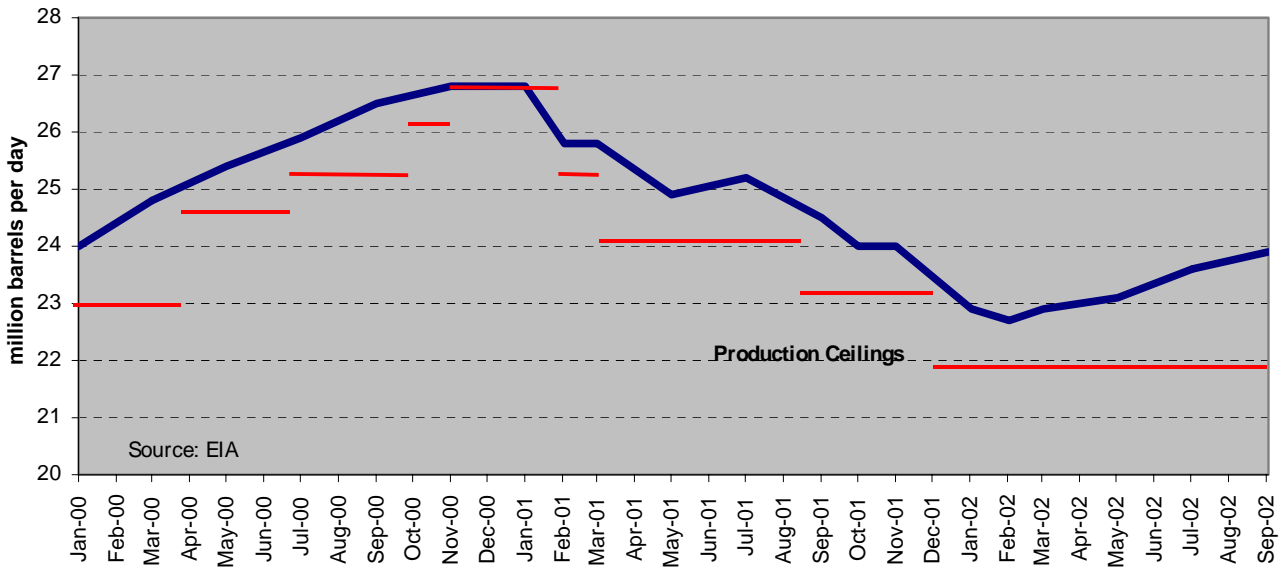
Country	Proposed Quotas				Crude Oil Production			
	Output Capacity Qcap		Bonus Qob	Total Allocation	Actual	Aliquot QA	Difference	
	%	mnbpd	bpd	Mnbpd	mnbpd	Mnbpd	bpd	%
Algeria	2.1	0.91	3,600	0.91	0.76	0.82	-60,000	-7
Indonesia	2.5	1.1	4,950	1.1	1.0	0.97	+30,000	+3
Iran	9.0	3.9	101,700	4.0	3.5	3.59	-90,000	-3
Iraq	6.7	2.9	18,450	2.9	2.4	2.61	-210,000	-8
Kuwait	5.3	2.3	0	2.3	1.8	2.07	-270,000	-13
Libya	3.2	1.4	5,850	1.4	1.3	1.25	+50,000	+4
Nigeria	5.3	2.3	16,200	2.3	2.0	2.07	-70,000	-3
Qatar	1.6	0.7	0	0.7	0.56	0.62	-60,000	-10
Saudi Arabia	20.0	8.7	57,600	8.8	7.2	7.80	-600,000	-8
UAE	5.3	2.3	5,850	2.3	1.8	2.06	-260,000	-13
Venezuela	5.8	2.5	8,100	2.5	2.5	2.25	+250,000	+11
Sub Total OPEC	66.8	29.0	222,300	29.3	24.8	26.0	-1,200,000	-5
Angola	1.8	0.8	20,700	0.82	0.8	0.72	+80,000	+11
Mexico	7.4	3.2	1,800	3.2	3.0	2.87	+130,000	+4
Norway	6.9	3.0	13,500	3.0	3.0	2.69	+310,000	+11
Russia	17.3	7.5	2,250	7.5	7.4	6.70	+700,000	+10
Sub Total Others	33.4	14.5	38,250	14.5	14.2	13.0	+1,200,000	+9
Total	100.0	43.5	260,550	43.8	39.0	39.0		

Notes: Output capacity refers to crude oil and does not include condensates, NGL's and oil from non-conventional sources.

**Fig. 1 Weekly Spot Crude Prices and the OPEC Price Band
January 2001 - October 2002**



**Fig. 2 OPEC 10 Crude Oil Production vs. Ceilings
January 2000 - September 2002**



**Fig. 3 World Oil and Gas Demand/ Supply
1980 - 2010
(MBDOE = Million Barrels per Day Oil Equivalent)**

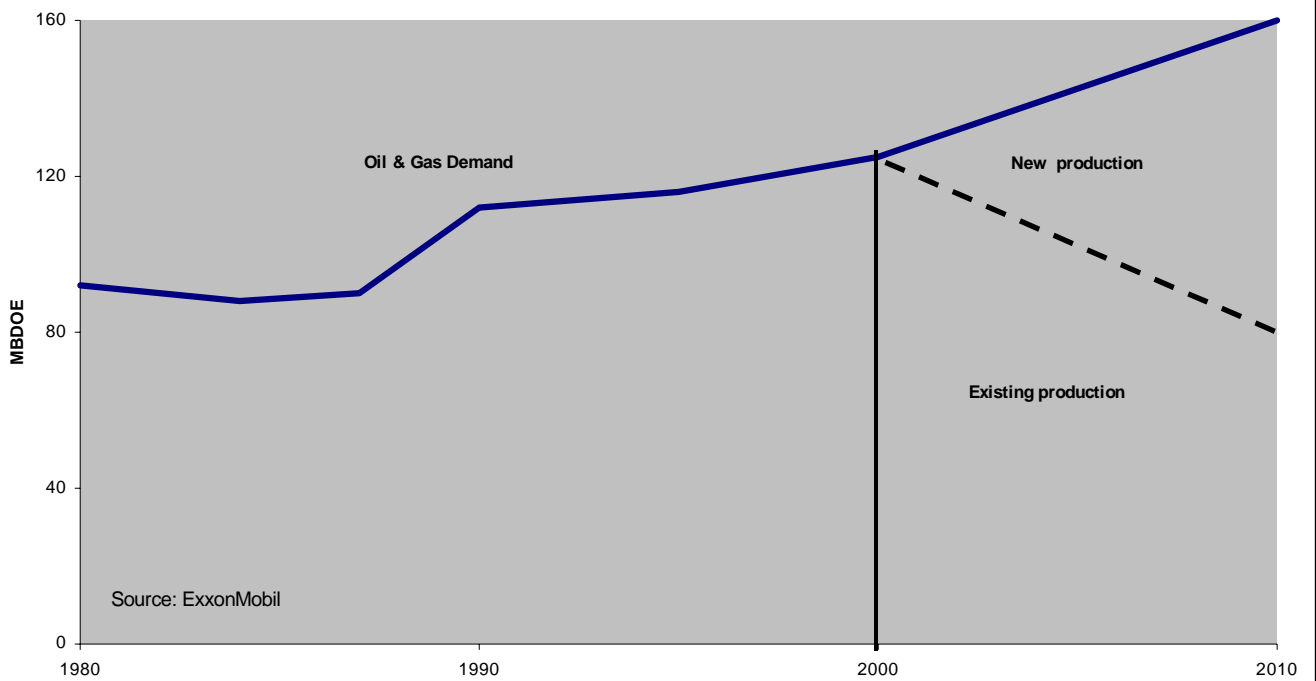


Fig. 4 Proven Crude Oil Reserves vs. Production Capacity for OPEC and Selected Oil Producing Countries

