

**The First Oil War:  
Implications of the Gulf Crisis in the Oil Market**

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by R Mabro

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Oxford Institute for Energy Studies

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# **THE FIRST OIL WAR**

*Implications of the Gulf Crisis for the Oil Market*

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This Report was prepared by a research team of the Oxford Institute for Energy Studies consisting of Léonie Archer, Phil Barnes, Cristina Caffarra, Joyce Dargay, Paul Horsnell, Coby van der Linde, Ian Skeet and Ala'a Al-Yousuf, and directed by Robert Mabro. Peter Beck provided helpful comments.

The Report as a whole is the sole responsibility of the Director.

## DIAGNOSIS OF A CRISIS AND POLICY STATEMENT

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*Contrary to a conventional wisdom which emerged in the first two weeks following the invasion of Kuwait, the world may well face a serious oil crisis.*

*The two most likely political scenarios - either an ugly and devastating war or a long trade embargo which will cut off oil supplies from Iraq and Kuwait to the rest of the world for many months to come - lead to the threat of an oil crisis. The only situation in which this threat would not materialize is the very unlikely one of a sudden end to the conflict in the next three or four weeks through a political volte-face on the part of Iraq or the USA, or some unexpected incident in Iraq.*

The theses of this report are that (a) the impact of this impending oil crisis can be significantly mitigated, and that it may even be avoided, if sufficient early and firm action is taken, and (b) the belief that a crisis is unlikely will help the threat to materialize and seriously aggravate the impact of an oil shock.

We define an oil crisis as a situation in which physical supply shortages of one or more petroleum products cause sufficient disruptions to markets to have severe effects on the lives of final consumers in some countries or regions and/or a situation in which crude oil prices (say Brent) suddenly move well into the \$30-40/b band.

The reasons recently put forward by several officials, spokespersons from oil companies, consultants, analysts and journalists in support of the view that an oil crisis is unlikely are that (i) oil stocks in the world are high; (ii) additional supplies will be forthcoming from OPEC and non-OPEC sources; (iii) the main players - governments and the oil companies - can be assumed to have learnt the lessons of the 1970s crises and that (iv) oil markets are now sufficiently developed and sophisticated to be relied upon far more than governments, to

allocate supplies effectively.

We argue in the report that these arguments do not constitute a case against the likelihood of an oil crisis, and that these factors operating by themselves without the support of remedial policies are quite insufficient to avoid a crisis.

The reasons for our view are simple. First, the observation that oil stocks are high fails to distinguish between crude oil and petroleum products and ignores the uneven distribution of oil inventories in the world. Furthermore, in a situation of grave uncertainties all those who hold stocks - governments, companies and final consumers - have strong incentives to add to rather than deplete their holdings.

Secondly, additional oil production from countries not affected by the embargo or hostilities will not easily fill the supply gap if it is directed to countries such as Japan who have a strong inclination in emergencies to increase their stockpiles.

Thirdly, although important lessons may have been learnt from the crises of 1973 and 1979 by all those concerned, it is not clear that these lessons are wholly

relevant to the present circumstances of the energy world. Over the last few years the downstream part of the oil industry has become more and more inflexible because of reduced excess capacity in refining in general and bottlenecks in upgrading plants, difficulties in coping with demanding petroleum products specifications imposed for environmental objectives, and reduction for reasons of economies of petroleum products stocks held by oil companies. This is a further and important consideration which negates the relevance of high oil stocks consisting mainly of crude oil in a crisis. Another change in circumstances, comparing 1990 with the 1970s, is that oil use is now more concentrated in the transport sector than before. Economizing on oil consumption by lowering heating thermostats in the home and the office, reducing industrial output, will not save as much oil as before.

Fourthly, the exclusive reliance on markets to allocate oil in times of uncertainty or supply disruption will bring about the very price explosion that constitutes an oil crisis. Today's oil markets are characterized by their swift reactions to shocks, an inherent tendency to overshoot, and strong and quick transmission of price changes between all crude oil and petroleum products markets. A localized shortage of say gasoline in a major region - USA, Europe or Japan - will cause an immediate price spike not only in world gasoline markets but, after a short lag, in all other spot and futures crude and products exchanges. This has frequently occurred in the past, and it occurs even if petroleum products shortages have nothing to do with the availability of crude oil. Furthermore, markets in a crisis allocate scarce supplies to those

who can afford the high prices, which may include speculators seeking oil for hoarding in the expectations of higher prices, not necessarily to those who need oil for immediate consumption needs.

The most worrying aspects of the oil situation today are the low levels of petroleum products stock in the world, the rigidity of, and bottlenecks in, the refining system, and the strong inclination shown by most governments in consuming countries (Japan seems to be an exception), to delay action either on the grounds that a crisis is unlikely and/or that free markets operating on their own will restore the balance. They will, in all situations, but at what price?

It is important to warn that a crisis is likely. The warning, if it induces early action is not a self-fulfilling prophecy of doom but a self-negating one. And this is precisely what needs to be achieved.

The Oxford Institute for Energy Studies, being an independent and expert research body, feels that it has today a duty to speak up. Our message is very simple: anticipate a crisis and immediately take preventive and remedial measures. The arguments of those who state that the crisis is unlikely are shallow, incomplete, and in certain cases plainly wrong.

The governments of OECD countries that are fortunate enough to hold very large stocks of crude oil should first refrain from adding to them and, secondly, announce efficient, credible and transparent measures for releasing them from all sources. The release may be linked to price movements on world oil markets. The knowledge that stated amounts of oil will be released from stocks whenever prices rise by x per cent over a given period of time can have a

strong stabilizing effect on price movements in free markets.

The US and the UK governments must also keep a very close watch on the operations of oil futures exchanges (Nymex, IPE etc) and of the Brent forward market and state emphatically that they will intervene if any attempt is made to corner a market.

Producing countries able to increase production should also announce clearly that they will do so in a targeted manner, that is by giving first refusal to countries such as Brazil, Turkey etc who are most immediately affected by the shutdown of production in Iraq and Kuwait. Non-targeted production increases will cause prices to rise in the first round because of bidding by wealthy buyers scrambling for this oil and in a second round because of the disappearance of some additional supplies in stockpiles. Producing countries have a right to insist on joint action with consuming countries holding large stocks in order to avoid a damaging price collapse after the crisis.

Finally, oil companies need to refrain from raising prices at the pump or to the final consumer as soon as the spot prices of crude oil or petroleum products rise. They should allow for the transmission lag between the oil well and the refinery and between the refinery gate and the final market, and make it clear that they only raise prices after the full passage of an appropriate time lag. Oil companies also need to increase refinery runs wherever possible in order to convert stocks of crude into stocks of products, and to review constantly the regional distribution of petroleum products stocks. They would be well advised to co-operate with governments on the design of a sensible stock release

programme and participate willingly in the implementation of such mutually agreed measures. To resist the notion of voluntary co-operation or to keep putting the ball back in the government's court is not merely unhelpful but short-sighted.

We are not advocating measures that are against the self-interest of those concerned. In fact these measures will serve their fundamental interests. The importing countries - both industrialized and developing - will lose economically from a serious oil crisis and should do their utmost to avoid it. The countries involved in the current political crisis (through the imposition of the embargo) may lose political room of manoeuvre if an oil crisis reduces public support for the sanctions. Oil companies will suffer ultimately from a crisis that will further reduce in the long run the size of the oil market, that is the volume of their business. Oil companies rightfully concerned about public confidence in the industry would avoid political problems if they show that they have done their utmost not to profit from their adversity. The short-term increases in commercial profits made in a crisis will not compensate for these future losses. And the producing countries know that price explosions and supply disruptions adversely affect their economic interests because they lead to prolonged periods of very low prices and revenues.



# **THE FIRST OIL WAR**

*Part 1*

## THE POLITICS AND ECONOMICS OF THE OIL CRISIS

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The current Gulf crisis is largely a conflict about oil. It is likely to develop into a war which would thus become the first oil war in world history.

The issues which provided Iraq with the pretext for its invasion of Kuwait were oil pricing policies and oil revenues. Of course, Iraq had broader political and regional objectives, but its most immediate and pressing concern was to loosen the economic and financial noose that was threatening strangulation. Low oil prices, technical limitations on current oil output and financial constraints on the investments required to reclaim or expand productive capacity were causing intractable problems for the government and severe hardship for the population. President Saddam Hussain was finding himself pushed further and further into a corner and tried to get out of it by invading Kuwait. This behaviour was utterly unacceptable and rightly condemned by the international community. But for the purposes of this analysis it is relevant to recall that oil was an integral part of the story.

Oil, a prime, though not exclusive, motive of Iraq's action, was also one of the powerful springbolts which triggered the American reaction. The USA moved politically and militarily with considerable might and amazing swiftness in order (a) to protect its own and OECD countries' access to the most important sources of world oil supplies, and (b) to remove from the Middle Eastern map a regime increasingly perceived as a serious security threat to Israel. Sadly, moral outrage at a gross infringement of international law - the occupation and annexation of a sovereign state - would not have caused by itself such a mighty reaction.

In short, the current conflict involves oil both as a factor and an objective. To put it bluntly, nobody would have done very much about Kuwait's sovereignty and threats to Saudi Arabia's security if oil had not been involved. Even the perceived long-term threat to Israel would have been dealt with in other ways. But this oil conflict has far-reaching economic, financial and political dimensions which transcend oil. And at the heart of the tragedy are the deaths and sufferings that the conflict will undoubtedly cause.

How will the conflict develop? Judging from what has happened so far, it appears that both Iraq and the USA have locked themselves into a situation which can only lead to war. Both Iraq and the USA have systematically closed, one after the other, all possible opportunities for mediation. Both sides have restricted for themselves any room for manoeuvre they might have had.

The options now facing the USA are either a military presence in the Gulf for an indefinite period to protect Saudi Arabia for the sake of oil supply security threatened by Iraq's military might, or to destroy Iraq's military capabilities and thus remove the threat. The first option is impractical because neither US public opinion nor the Arab

world will accept it for very long. The second involves considerable costs in human lives and material damages. It would also alienate, with severe consequences, Arab populations in every Arab country from their governments, and the Arab world as a whole from the West.

The presence of large numbers of foreigners in Iraq and Kuwait involves risks in both cases. Some may die if hostilities break out. Some may die if Iraq is subjected over a long period to a blockade which pushes its government further and further into a tight corner.

The infernal logic of this situation is that foreign hostages are in jeopardy whatever happens, that the stability of the Arab world is deeply shaken in all cases, and that the stated objectives of US intervention - the restoration of Kuwait and the security of Saudi Arabia - can therefore be more swiftly achieved (the tragic costs being what they are) by a war.

We consider in this report two scenarios:

- (a) a war which causes serious panic in oil markets and deep cuts in oil supplies over a three-month period; and
- (b) a long drawn blockade without major hostilities, lasting six months or more.

Sadly, we attach a higher probability to the first.

A third scenario, with low probability, is a rapid end to the conflict through either a political volte-face on the part of the USA or Iraq, or some internal upheaval in Iraq. If the conflict ends in some manner in the next three or four weeks, the issue of an oil crisis, as it were by definition, will not arise.

An oil war causing an oil problem would be different from the 1973 shock when the use of the oil weapon was the consequence, not the cause, of the Arab-Israeli conflict which set the crisis in motion; different from the 1979 crisis when oil problems were the consequence, not the cause, of the Iranian revolution which induced the shock.

In 1973 a group of producing countries voluntarily curtailed oil supplies and embargoed certain destinations. In 1979 a revolution in a major producing country disrupted the flow and pattern of oil supplies. By contrast, the current interruption of oil supplies from Iraq and Kuwait is the result of a punitive action imposed by major consuming countries. The essence of this 1990 oil crisis is that consuming countries concerned about secure access to oil supplies in the long term have determined that future security depends on political and military measures whose by-product is to disrupt their access in the short term. This is a main difference between this 1990 conflict and the two crises of the 1970s. The oil supply pattern in the next weeks or months will depend in the first instance on the actions and decisions of major consuming countries. The producers are no longer the prime movers in this area but their reactions, either to the embargo or to subsequent hostile acts, will naturally have secondary repercussions on the volume and pattern of oil supplies.

Does this mean that the current crisis involves less uncertainties for the USA and other OECD countries than the previous ones? Some argue that the US government, being in charge of the embargo, will be in a better position to anticipate the course of events on the oil supply front than in 1973 when the production cutback was imposed by Arab countries, or in 1979 when nobody could predict the development of the Iranian revolution. We do not believe that the current crisis involves less uncertainties than the previous ones for the plain reason that events are not fully controlled or controllable by the USA.

Oil supplies are therefore at the centre of this new crisis. No amount of soothing statements from governments of consuming countries, oil companies and international organizations can disguise this fact. The many technical reports and analyses, and the press articles that have purported to show that the conflict need not cause an oil crisis, are misleading. They may have been prompted by good intentions: the desire to avoid unhelpful, and in any case, premature panic and to prevent traders and speculators from bringing forward the day when prices will inevitably explode. But they tend to reflect serious misunderstandings of the nature and implications of the supply problems and of the likely behaviour of all economic agents - governments, companies, producers, traders, and consumers - who produce, manage, sell and buy oil.

They involve in any case important fallacies, the most common and perhaps the most pernicious being the arithmetic fallacy of aggregation. In essence, much of the reasoning behind this complacent view that world oil supply and demand will balance, that stocks are abundant and will close easily any gap between oil production and consumption during the crisis is based on a simplistic accounting exercise in which one adds up two columns of numbers and finds perhaps that the two aggregates may after all be equal, or of a similar magnitude.

We present in the next section our assessment of the oil supply/demand equation in the fourth quarter of 1990, the critical period during which an oil crisis will probably manifest itself. The results are that the supply shortfall in case of a long embargo (second scenario) may not be very large. If all goes well in OPEC and non-OPEC countries unaffected by the embargo, the shortfall, compared with "normal" demand in the fourth quarter, would be of the order of 2.7 mb/d. It would appear, if arithmetic accounting was the whole story, that this need not cause any problem.

The war scenario involves a much larger shortfall albeit over a shorter period. In this case, even the accounting exercise involves little comfort.

To infer that markets will function smoothly, prices will remain stable and demands for various oil products in their multifarious uses will be met all round the world from the existence of some apparent balance, at the global level, between oil supply and demand is wrong.

The reasons are as follows:

- (1) The fundamental weaknesses of the present oil system are the low level of petroleum products stocks in the USA and other parts of the world, and the

rigidities and bottlenecks which plague the downstream of the oil industry. In a subsequent section, *The Home Front: Petroleum Products and Supply Security*, we show that there is only one day's immediately usable gasoline inventory in the USA. To add to petroleum products stocks by increasing refinery runs may not prove easy considering that present utilization rates, as shown in the above-mentioned section, are very high (95 per cent in Germany, 89 per cent in the UK and 86 per cent in the USA).

The relevant cushion in a situation of great uncertainty - when any news of an act of war, or fears of a disruption caused by the build-up of tension over hostages or through political manoeuvres, could cause sudden panic buying - is provided by petroleum products stocks in the hands of companies (the Strategic Petroleum Reserve in the USA only holds crude oil). Because they are low, they constitute the Achilles' heel of the system. In a panic, private motorists alone can suddenly add to world demand for gasoline 10 million barrels by raising the average contents of their car tanks by only one gallon.

These factors are likely to destabilize markets and push prices up.

- (2) On the crude oil front, the restoration of the supply/demand balance, which as mentioned above appears fairly easy, in an accounting sense, in one scenario, may still induce a rise in prices. This is because the initial supply shock, a reduction of oil supplies by 4.5-5.0 mb/d from Iraq and Kuwait (see section on the Oil Supply/Demand Balance), together with the subsequent compensation by new supplies from certain OPEC and non-OPEC countries, involves considerable changes in the pattern of oil flows in international trade.

Thus, a country or a company which used to obtain supplies from Iraq or Kuwait will immediately seek quick replacement from another source. It will probably offer a premium in order to displace existing customers and obtain some oil from the new supplier. This displacement process played a major role in pushing prices up during the 1979 crisis. It is not certain that the market structures, which have developed in recent years a formidable array of sophisticated trading instruments, would provide an orderly channel for this replacement process and dampen its explosive impact on prices. In a crisis, these market structures may cease on occasions to provide a reference for the pricing of physical sales from producing countries. We believe that when the crisis deepens producers will abandon the so-called market-related formulas for the pricing of real transactions if they feel that futures markets in New York and London are being manipulated, or are not fully reflecting the levels of bids which hungry buyers are willing to make.

There are already signs that this is happening. In early August Japanese companies rushed to Iran in order to obtain some oil in replacement of lost supplies from Kuwait and Iraq and offered price premiums. This phenomenon will spread as the crisis unfolds even though some producers will certainly put additional volumes on the market. Those who have lost access will scramble to get hold of a share of these additional supplies. Everybody will have a strong incentive if at all possible to rush to the head of the queue because of

uncertainties about how much additional supplies in relation to demand will be available. And this simply means that everybody who can afford it will bid prices up. In economist's language, oil price rises result from bidding at the margin. To say that prices will remain stable because on average, or in aggregate, demand and supply are in some arithmetic or accounting balance misses the point. The current situation involves considerable changes in the pattern of supply in international trade, and in the structure of consumption/inventory demand. These shifts occurring at times of political fears and economic uncertainties cause:

- (a) producers to seek higher prices for additional supplies;
- (b) buyers to offer higher prices for replacement supplies;
- (c) all economic agents to increase at the margin their demand for stocks, thus absorbing part of the additional supplies put on the market to close the production gap, and pushing prices further up.

This, in our view, is one of the economic mechanisms which would lead oil prices to rise, and at times to rise significantly, during the present political crisis.

- (3) In a period of serious conflict and great uncertainties, the *ex ante* demand for stocks rises because of a variety of important economic and precautionary factors. Not all the reasons for holding on to existing stocks or seeking to increase them are related to sinister motives. These reasons are explained in the section The Home Front. First, firms will wish to smooth production. Secondly, they will want to avoid stock-outs, that is a situation when the depletion of their inventories would force them to call on force majeure clauses in their contracts, prevent them to supply regular customers or complete previously agreed transactions.

As mentioned before, final consumers would want to add to their stocks - be it of gasoline, heating oil or kerosene - either for precautionary reasons or for the sensible economic motive of beating a threatening future increase in prices.

Governments at the beginning of an emergency will be very cautious about releasing strategic stocks, holding onto them for as long as possible lest the emergency should worsen. The initial responses to the current crisis of both the IEA and most governments of industrialized countries are typical of this "wait and see" attitude which is perfectly understandable even if unhelpful. The governments of countries which feel very vulnerable to oil supply disruptions, such as Japan, tend to go further and rush to scout the markets for additional supplies for their stocks, however high these may already be.

Finally, the speculative motive for holding onto, or building up, stocks is never absent in situations when some economic agents expect prices to rise. Governments are either naive or disingenious when they complain, on the one hand, that companies, traders and households are behaving in ways which are in fact economically rational, and insist, on the other hand, that free markets provide the best mechanisms for allocating resources in a crisis.

Because of the economics of inventory behaviour, which is always countercyclical, and aggravates the price impact of a shortage (as it does, in the opposite direction in a glut) the restoration of a supply/demand balance during a disruption is made that much more difficult without policy intervention and may involve significant price rises.

- (4) The oil markets as they are structured today respond both quickly and nervously to shocks. In the two weeks following the invasion of Kuwait, the political news and the knowledge that oil supplies had been curtailed by 4.5-5.0 mb/d pushed up petroleum product prices in Rotterdam by between 36 and 72 per cent depending on the product (see the section on Petroleum Products: Prices and Demand). The price rises were both significant and immediate. By contrast, in the 1978-9 crisis, the Rotterdam market did not react at all to the news of the Iranian revolution and the curtailment of Iranian production by 4.5 mb/d which occurred in the first week of November 1978. Prices did not rise until February 1979, more than three months later, when they responded in the same way as in the first two weeks of August 1990.

Oil markets also have a tendency to overshoot. Finally, they are strongly interconnected by immediate arbitrage and cross-hedging trading responses which transmit price changes from one market to others (say for a particular crude to other crudes and products, or for one petroleum product to other products and crude oil). A shortage in one part of the world petroleum system causes prices to rise everywhere, even in markets which are not suffering from a real imbalance. This is one reason why statements and arguments about "unlikely crises" based on the observation that the world oil market is in, or will quickly display, an aggregate balance are wrong. Prices rise, and in a crisis explode, across the whole system whenever one of its constituent parts is in disequilibrium. In normal circumstances, subsequent adjustments bring prices back to their original levels once the local problem is resolved. In a crisis, these adjustments are delayed because the price shocks induce additional uncertainties and destabilizing panic responses.

In crises, governments have a duty to intervene. One may argue, of course, that governments are generally unable to design and implement policies that improve the situation; that they only make things worse and should keep their hands off. This pessimistic view does not absolve economists from the responsibility of defining and advocating appropriate policies.

We have shown in this section that without policy intervention the "rational" behaviour of economic agents and the free operations of oil markets as extant today would aggravate the crisis. The *ex ante* demand for stocks would rise. In the section on Petroleum Products: Prices and Demand we argue that higher prices and taxes, by themselves, would not reduce oil consumption significantly in the short run. We argue that markets have a tendency to overshoot and to respond to a local imbalance with a generalized price rise.

Policy measures are thus needed (a) to counteract the normal inventory behaviour

by releasing stocks, (b) to reduce, if necessary, oil consumption by mandatory conservation measures, (c) to intervene in markets threatened by a speculative squeeze and (d) to direct additional crude oil production, on a first refusal basis, to countries that have suffered the initial impact of the supply disruption.

Co-ordination between companies and governments, and between those producing countries able to increase oil output and the consuming countries with large strategic stocks, would improve significantly the situation. Continually throwing the ball back to the other court, behaviour already much in evidence today, will not serve in the end the fundamental interests of all parties concerned.

The policy proposals were presented and explained in our statement at the beginning of this report. Their early implementation would greatly mitigate the effects, if not avoid altogether, a damaging oil crisis. Whether these damages will or will not be greater than those inflicted by earlier crises is beside the point. Many analysts have recently indicated that they are likely to be smaller than in the 1970s and 1980s, but this does not mean that they should be ignored if they can be avoided or minimized by government policy.

An oil crisis causes inflation or recession or both. It impoverishes further the poor. It will affect the future of the oil industry and harm considerably the economies of oil-producing countries. We believe that a very deep crisis is avoidable and fear that it will not be avoided; that damages and costs of any potential crisis are amenable to mitigation, and fear that they may not be sufficiently mitigated.



## THE OIL SUPPLY/DEMAND BALANCE

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The current Gulf conflict involves the loss for the world of a volume of crude oil and NGLs which roughly corresponds to the amount that Iraq and Kuwait (including Kuwait's share of the Neutral Zone) would have exported in normal circumstances from 2 August 1990 onwards.

This volume thus equals production minus domestic consumption. We estimate the latter on the basis of recent data at 0.4 mb/d. But how much would have been produced by Iraq and Kuwait in August and the next few months?

A first answer is based on OPEC's production policies. One may argue that Kuwait would have stuck to its OPEC quota beginning in August because of Iraq's pressures, and that Iraq would have produced as much as it could, which is a bit more than its official quota. Kuwait's quota, as agreed in Geneva in July 1990, included its share of the Neutral Zone and was 1.5 mb/d; Iraq's quota was set at 3.14 mb/d. In this hypothesis the loss is estimated at 4.64 mb/d of crude oil plus 0.11 mb/d of NGLs plus an eventual increase in Iraq's production of 0.15 mb/d on average between August and December 1990, minus 0.4 mb/d of domestic consumption. This adds up to a loss to the world of 4.5 mb/d of crude oil and NGLs.

An alternative answer is based on actual production in July 1990. According to the IEA, July production of crude oil was as follows:

Iraq	3.10 mb/d
Kuwait	1.60 mb/d
Neutral Zone (50%)	0.15 mb/d
	-----
	4.85 mb/d

Adding NGLs gives us 4.96 mb/d of production, and therefore a loss to the world of approximately 4.6 mb/d.

According to *MEES*, however, the production estimates for July are as follows:

Iraq	3.28 mb/d
Kuwait	1.75 mb/d
Neutral Zone (50%)	0.16 mb/d
	-----
	5.19 mb/d

Adding NGLs and subtracting domestic consumption gives an estimated loss to the world of 4.9 mb/d.

A third approach is to assume that in normal circumstances, that is in the absence

of any Iraqi threat, both Iraq and Kuwait would have produced in the fourth quarter of 1990 at maximum capacity in conformity to the policies pursued in the past. This we estimate as follows:

Iraq	3.1 mb/d rising to 3.4 mb/d (avg 3.25)
Kuwait	2.0 mb/d
Neutral Zone (50%)	0.2 mb/d

This adds up to 5.45 mb/d of crude oil plus 0.11 of NGLs, that is 5.56 mb/d. Subtracting consumption gives an estimated loss to the world of 5.16 mb/d.

Thus depending on assumptions about the state of the oil world in the absence of a crisis, we find that the loss of oil supplies to the world ranges between 4.5 and 5.16 mb/d. In any scenario - whether we assume that the conflict lasts either three or six months - the critical period for oil falls within the fourth quarter of 1990. The relevant demand and supply balance is therefore that of the fourth quarter.

According to the IEA *Oil Market Report*, August 1990, which was prepared and published before the invasion of Kuwait, the oil balance in the fourth quarter in the world outside CPEs, was as follows:

Oil Demand: OECD	39.6 mb/d
Non-OECD	15.7 mb/d
	-----
Total	55.3 mb/d
Oil Supply: Non-OPEC	25.8 mb/d
Net Imports from CPEs	1.7 mb/d
Processing Gains	1.3 mb/d
	-----
Total	28.8 mb/d

This implies a call on OPEC for crude oil and NGLs of 26.5 mb/d and for crude oil alone of 24.6 mb/d (NGLs are at 1.9 mb/d) assuming no stock change. In previous years, stock changes in the fourth quarter were of the order of -0.6 to 1.1 mb/d. One would have expected therefore a call on OPEC crude of 23.5 to 24.0 mb/d.

Let us draw two alternative "normal" scenarios of OPEC's behaviour in the fourth quarter. The first assumes that OPEC would have adhered strictly to quotas and supplied 22.5 mb/d of crude oil. This would have caused a further stock draw-down of 1.0 to 1.5 mb/d, or a total draw-down of 2.1 mb/d, and most probably a price rise. The second assumes that OPEC would have responded to the call for its oil and produced 23.5 to 24.0 mb/d.

In the first scenario, the relevant estimate of production loss from the Gulf crisis

is 4.5 mb/d, in the second it is an estimate close to the upper range of 5.16 mb/d as calculated before; let us say 5.0 mb/d.

The important question now is how much of this supply gap of 4.5 to 5.0 mb/d could be made up from production increases from other sources. Consider the non-OPEC region first.

Most of the major non-OPEC producers could fairly easily produce above present levels for a month or so using a variety of short-term ploys. Boosting output on a more sustained basis through expanding and rationalizing the capacity of producing and handling facilities and bringing forward projects would take longer but much can be done in a few months with the necessary stimulus. This would require a firm perception that the crisis is not going to go away in a few weeks but will last for several months at least.

Oman and perhaps the Yemen could, if the political will were present, increase output by small amounts almost immediately and much more after a few months as, perhaps, could Malaysia and one or two others such as Angola and Canada. Mexico is said to have little excess capacity at present, although the Mexican government is reported to have promised to supply an additional 0.1 mb/d to the USA over the next two months. Much of this will have to come out of either potential exports elsewhere, or out of domestic consumption, with perhaps 25 per cent or so quickly obtainable by boosting existing flows. Over six months, given adequate technical and financial assistance much more substantial increases could be expected.

In the USA itself, despite the planned maintenance work currently taking place in Alaska, perhaps an additional 0.05 mb/d could be made available by quickly enhancing yields. The supporting industries have plenty of spare capacity available.

Over a six-month period with firmly rising prices and perceptions of a long haul before the crisis is resolved, many non-OPEC countries would have both the potential and the motivation to increase output over present notional capacity limits. In many cases additional volumes would be in thousands of b/d rather than hundreds of thousands.

In total, we expect that at least an additional 0.4 million b/d could be made available from non-OPEC sources over the next three months increasing to about 1 mb/d if the shortfall lasts for six months.

The other source of additional supplies could be an increase in exports by the USSR and China to the West. The USSR has already intimated that it would try to help although its long-running and increasingly difficult production problems would seem to rule out any increase in indigenous production. The USSR is itself an importer of Iraqi oil, largely for re-export. The opportunity to improve hard currency earnings might stimulate additional exports but the volumes involved are, in any case, unlikely to be substantial.

The largest potential for additional supplies lies with the OPEC countries,

although the bulk of the spare capacity is in countries that may well find themselves embroiled in any hostilities that occur. The size of the shut-in potential that some OPEC countries clearly have is a major factor in determining whether or not the loss of supplies from Iraq and Kuwait can be made up without too much pain. Maximum sustainable potentials are often quoted although the accuracy of the capacities indicated is less certain than is sometimes pretended.

Our estimates of present capacity in OPEC countries (other than Iraq and Kuwait) are as follows:

Algeria	0.800
Ecuador	0.280
Gabon	0.280
Indonesia	1.300
Iran	3.200
Libya	1.600
Neutral Zone (50%)	0.250
Nigeria	1.900
Qatar	0.400
Saudi Arabia	6.500 - 7.200
UAE	2.200
Venezuela	2.200
	-----
	20.910 - 21.610

These estimates are not very controversial except for Venezuela, which has been claiming consistently that its sustainable production capacity is much higher than the number shown. Venezuelan statements on this issue have referred to different numbers which range widely between 2.4 and 3.2 mb/d. Our view is that any available capacity above 2.2 mb/d (or even a lower amount) refers to heavy crudes which cannot be handled by the refining system in its current state.

If all OPEC countries other than Iraq and Kuwait produced flat out to the maximum of their capacity, they would be able to sustain an output of crude oil between 21.0 and 21.6 mb/d. For short periods, these limits can be exceeded almost immediately but the excess is not sustainable without damage to fields, without further investment and additional maintenance work and workovers. If required investments are undertaken soon additional capacity of 1.0 mb/d may become available after four or five months and 1.5 mb/d or even 2.0 mb/d after six or eight months.

In a scenario of military hostilities - the shorter but more dramatic conflict - one may not assume that the Gulf countries (meaning Iran, Saudi Arabia, Qatar and the UAE) will necessarily be able to produce without disruption. Furthermore, a war may lead to political reactions in other parts of the world - Algeria, Libya and the Yemen - causing other production cutbacks.

In a scenario of a long and drawn out embargo, imposed without any escalating

acts of violence, additional supplies from the OPEC countries will undoubtedly come onstream increasingly over time.

Thus the supply picture for the fourth quarter of 1990 can be modified as follows, under the war and embargo scenarios. We allow only for production increases expected within three months.

	War Scenario	Embargo Scenario
Non-OPEC: normal	25.8	25.8
additional	0.3	0.4
Net Imports from CPEs:	1.7	1.7
Processing Gains:	1.3	1.3
OPEC crude	19.0 - 21.6	21.0 - 21.6
OPEC NGLs	1.0 - 1.8	1.8
TOTAL	49.1 - 52.5	52.0 - 52.6

The most favourable supply picture (52.6 mb/d of crude and NGLs) involves a shortfall of 2.7 mb/d from "normal" 1990 fourth quarter demand, and the least favourable (49.1 mb/d) a shortfall of 6.2 mb/d.

The situation improves in the first quarter of 1991, since non-OPEC production could eventually rise by 1.0 mb/d and OPEC capacity (in the embargo scenario) by 1.5-2.0 mb/d.

To conclude, were aggregate arithmetic balances to constitute the whole of the story, the favourable scenario suggests an avoidable crisis. A shortfall of 2.7 mb/d in the fourth quarter can be easily met by a stock draw-down of say 1.7 mb/d, although this is more than the normal stock draw-down in the fourth quarter of recent years, and by 0.5-0.6 of fuel switching (see the section on the Potential for Fuel Switching in the Short Term), and other small reductions in oil consumption. This, of course, assumes that increased *ex ante* demand for stocks does not compete with other demands for available supplies. This competition will always restore the balance *ex post* but at a much higher price.

In the war scenario, or in any situation involving hostile acts that affect navigation in the Gulf or destroy some oil installations, the supply gap could become very large and the situation would require the early adoption by importing countries of very effective remedial measures.

## PETROLEUM PRODUCTS: PRICES AND DEMAND

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*In this section we shall concentrate mainly upon two issues relating to petroleum products demand and prices. The first concerns the implications of the crisis for oil product prices and the impact which any increases may have on demand, and particularly for gasoline and gasoil. Primarily, we are concerned with the short-term effects, since demand must respond quickly if a supply crisis and further upwards pressure on prices are to be mitigated. The second issue concerns likely seasonal trends in gasoline and gasoil demand, that may accentuate or alleviate a supply shortage.*

The events of the past few weeks have seen the spot price of crude oil (Brent) rise from about \$19/b at the end of July to around \$27/b on 17 August. At the same time product prices on the Rotterdam spot market have followed, with gasoline increasing from \$262/t to \$358/t, gasoil from \$179/t to \$245/t, naphtha from \$168/t to \$290/t, and heavy fuel oil from \$75/t to \$115/t. Gasoline and gasoil prices have increased by \$96/t and \$66/t respectively, or about 6.8 cents per litre and 5.6 cents per litre respectively. The comparable increase for fuel oil was \$40/t. The price of naphtha has risen by \$122/t, but its initial price was unusually low in comparison to gasoil.

These price increases, if sustained, will find their way to the consumer, as has been happening already, particularly with gasoline. Let us assume that spot crude and products reach in 1990 or early 1991 the same peak levels as in 1979-80 (when crude surpassed \$40/b, gasoline and naphtha reached \$400/t, gasoil approached \$360/t and fuel oil exceeded \$200/t). The inflationary impact on consumer oil prices in this case will not be as significant as in 1979-80. Although in absolute terms, the increase passed on to consumers is likely to be the same nominally, an average world-wide rate of

inflation of over 10 per cent annually during the 1980s certainly mitigates the real effect, as related to other goods. Rising real income, particularly in the industrialized countries, will also lessen the impact of the price increase on consumption standards. However, falling real incomes in many of the developing countries will cause these to be harder hit than previously. The developing world will face the greatest burden.

If one takes inflation into account, the real price of gasoline in OECD countries today is between 20 and 50 per cent lower than that in 1980. In most European countries it is about 20 per cent lower, while in Japan and the USA it is about 40 per cent and 50 per cent lower respectively. Prices can thus rise, depending on the country, by 25 to 100 per cent, and still, in real terms, be no higher than in 1980.

Residential light fuel oil is also far cheaper in real terms today than in 1980, by about 30 to 50 per cent in OECD countries. Only in Denmark, Sweden and Italy has increasing taxation been sufficient to keep real prices high. In many countries - Germany, Japan, the Netherlands, UK and the USA - even nominal prices fell. In these countries, prices could rise between 40 and 100 per

cent, depending on the country, and still be no higher in real terms than in 1980. Because of generally lower rates of taxation for industrial use, the real price fall for industrial consumers has been even more significant.

How much will consumer oil prices rise in nominal terms? The \$200/t rise in spot gasoline prices between 1978-80 led to pump-price increases of between 20 and 40 per cent in Europe and Japan and 80 per cent in the USA, largely due to differences in initial prices and taxation rates. Since nominal prices are higher now than in 1978 and taxation has become a more significant proportion of gasoline prices in all countries - from about 50 to 60 per cent on average in Europe and from 20 to 30 per cent in the USA - an equal dollar rise in the oil price today will lead to smaller percentage increases than previously. Price rises of around 20 per cent in Europe and 50 per cent in the USA would seem probable.

Residential fuel oil prices in the OECD rose on average by between 80 and 100 per cent in conjunction with the \$180 rise in the spot gasoil price in 1978-80. A similar rise today would translate into consumer price increases of between 50 and 60 per cent in most OECD countries, and by around 30 per cent in the high-price countries mentioned earlier. For industrial consumers, the price increase will be somewhat greater, because of the relatively minor role of taxation. Lower initial prices combined with lower taxation rates will clearly make domestic fuel oil prices more vulnerable than gasoline prices to increases in world oil prices.

The message is basically that even if the price increases turn out to be greater than those experienced in 1979-80, we

would still have a long way to go before oil prices were as high, in real terms, as in 1980.

Nevertheless, one should not underestimate the effects on consumers. It seems likely that a 50 per cent rise in oil prices would decrease consumption standards directly for an average household by about 1 to 4 per cent, depending on their reliance on oil for energy needs. And the burden will not be shared equally. Again the poor will suffer most. Other effects - on industry, on the prices of other goods, on income distribution, on the economy in general - will clearly be negative.

Of course, as we have learned from the experience of previous oil price shocks, demand is sensitive to price. As demand adjusts, the negative effects will be reduced. And as demand falls, so will price. However, the greater part of the impact on demand occurs only over a period of years. In the short term - within a few weeks or months - the effect will be negligible as there is little possibility for substitution. For the lighter products - gasoline and heating oils - demand will probably remain high despite rising prices. Econometric studies indicate a short-run price elasticity for most oil products of between -0.1 and -0.3, although the short run is generally defined as a year. It is thus unlikely that an elasticity greater than -0.1 would be relevant for the shorter period with which we are concerned. Given this, a price increase by 50 per cent would only lead to a 5 per cent reduction in demand. However, much depends on expectations. For example, the immediate response - say within a week or so - to a price shock may be an increase in demand as consumers, in fear of yet higher prices, bolster their stocks, thus putting more

pressure on prices.

Finally, as was stressed in other sections, the crisis is more one of products than of crude. This being August, the end of the summer season, the next few months will mean a shift in product demand from gasoline to heating oils (gasoil). The significance of this is shown in the following table, which gives the estimated increase or decline in demand for the fourth quarter of the year, as compared to the third quarter (June-September). The estimates are based on considering the seasonal components of quarterly demand for the past three years.

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**Estimated Change in Gasoline and Gasoil Consumption in the Fourth Quarter of 1990. Per cent of Consumption during the Third Quarter 1990.**

	USA	JAPAN	EEC	OECD
Gasoline	-1.8	-1.7	-5.4	-2.9
Gasoil	20.0	19.5	20.9	19.8

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From the table, we see that in the OECD as a whole gasoline demand should be almost 3 per cent lower during October to December than it would normally be during July-September. The decline is greater in Europe than in the USA and Japan. Monthly data show demand to peak in August in both the EEC and the USA, and to fall by around 5 per cent in September, and on average by 5 and 8 per cent in October-November in the USA and EEC respectively. For gasoil, we could expect a 20 per cent increase in all the OECD, as stocks are replenished for the winter.

August is a low point for demand, and consumption should begin to pick up marginally in September, with the greatest increases - under normal circumstances - in November-December in Europe and in December-January in the USA. Actual consumption will, of course, be determined by the severity of the winter.

*In conclusion, it appears that the price increases which might occur if the crisis in the Gulf continues will do very little in preventing an oil product shortage in the short term. Increasing taxation substantially may have some additional effect, but the negative consequences must also be considered. Various types of rationing might prove more desirable, should the need arise. In any case, panic buying can tend to exacerbate matters, pushing prices up. As winter approaches, heating oil demand will increase, and if consumers replenish stocks earlier than usual shortages may occur. The same will happen if consumers increase their gasoline stocks, but this may be attenuated somewhat by a fall in gasoline consumption as the holiday season comes to an end.*



## THE POTENTIAL FOR FUEL SWITCHING IN THE SHORT TERM

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Over the next few months, the main potential to switch out of oil in the OECD countries lies largely in power generation and to a lesser extent in those industries still burning oil for low-grade process heat. Although some conservation might take place amongst transport users and purchases of gasoil for heating may be reduced or postponed the opportunities for switching quickly to other fuels are extremely limited. This means that most fuel switching in the OECD will only reduce consumption of heavy fuel oil. In developing countries where traditional fuels are still widely used there is a long tradition of domestic consumers switching between kerosene and LPG and fuelwood with fluctuations in price and availability. As with the OECD countries, much depends on the way in which higher prices are passed through to the consumer and on the likelihood of actual scarcity of particular products.

In order to give a measure of the scope for substitution, we have estimated the pattern of oil demand in the main regions by markets for 1989 and 1990. The latter is shown on a "normal" basis of no crisis.

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### Oil Demand by Markets, 1989 and 1990

		Million Barrels per Day	
		1989	1990
USA	Electricity generation	0.8	0.9
	Industry	1.3	1.3
	Residential etc	2.7	2.7
	Transport and others	11.2	11.4
	Total	16.0	16.3
Other OECD	Electricity generation	1.3	1.4
	Industry	2.1	2.3
	Residential etc	3.8	3.9
	Transport and others	12.3	12.6
	Total	19.5	20.2
DCs	Electricity generation	2.1	2.3
	Industry	2.0	2.2
	Residential etc	2.5	3.0
	Transport and others	8.1	8.3
	Total	14.7	15.8
Total	Electricity generation	4.2	4.6
	Industry	5.4	5.8
	Residential etc	9.0	9.6
	Transport and others	31.6	32.3
	Total	50.2	52.3

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It can be seen from the above that only a fraction of current oil demand is open to switching. Over 60 per cent is taken up with transport fuels, lubricants, chemical feedstocks etc for which there is no immediate or even medium-term alternative. Of the other market segments, electricity generation has traditionally offered the quickest substitution possibilities. Only 7 per cent of electricity is generated in oil-fired plant in the USA and Western Europe. In Japan the proportion is around 19 per cent and in the developing countries it is nearly 25 per cent.

A reduction in oil used for electricity generation can obviously be achieved by using oil-fired plant less and other plant more. This is usually done by pushing oil-fired plant down the merit-ranking order of use or eventually even closing plant down altogether. In the USA and Japan the main alternative, coal-fired plants, is almost fully utilized. In both countries there is new nuclear plant, either just coming in, or in the run-up stage to full load, that could be brought forward to take up more of the load. There may be some potential to run gas-fired plant at close to, or above, capacity ratings but this seems likely to be limited. In Western Europe, there is believed to be some spare coal capacity that could be run at higher loads. In both Western Europe and the USA, there is some dual and even triple-fired generating plant that can be switched within hours. However this type of capacity is small in relation to total generating capacity.

In developing countries, with electricity growing at 10 per cent or more per annum and existing power plants fully utilized to avoid "brownouts", there is very little real scope for switching from oil over the next few months.

In industrial markets, most of the industries that use oil for basic process heat (such as cement) have long switched to coal. It is, however, a market that is still sensitive to alternative fuel prices. In periods of low fuel oil prices in 1986 and 1988 there was some switching back to oil burning and scope for a reversal still remains. In other industries, there is some dual-fired capability with gas. A US census of 1985 indicated that a maximum of 93,000 b/d of oil could, at that time, be switched out of the US manufacturing industries within a month. However, significant changes have occurred to the pattern of fuel use in the US industries since 1985, and this estimate cannot be taken as a guide today.

Any attempt to estimate potential switching capabilities can thus only be based on very broad assumptions and indications. Much depends on government action in the market place and users' reactions to uncertainty.

An indication is given below of the potential. It represents what could be done if action were taken given the perception of the length of time the crisis would last and thus represents an upper limit to what might actually occur.

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### Potential Reductions of Oil Consumption from Fuel Switching

		Million Barrels per Day	
		Within three months	Within six months
OECD	Electricity Generation	0.3	0.5
	Industry	0.1	0.2
	Domestic	-	-
	Total	0.4	0.7
DCs	Electricity Generation	-	0.1
	Industry	0.1	0.1
	Domestic	0.1	0.3
	Total	0.2	0.5
Grand total		0.6	1.2

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Although representing a useful potential saving, it is clear that substitution is unlikely to play a significant role in balancing the oil shortfall over the next few months. Furthermore it will largely reduce the demand for heavy fuel oil which is probably the least vulnerable petroleum product in the early stages of the crisis.

## THE HOME FRONT: PETROLEUM PRODUCTS AND SUPPLY SECURITY

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*In an oil war the home front is the gasoline service station, since oil supply disruptions essentially relate to what happens to products. The political damage of the disruption is caused by gasoline queues and petroleum product price spikes. The barrel of crude is an abstract notion for the general public. Therefore, the yardstick to assess the impact of the crisis and the success or failure of government policy is the length of queues and the size of price spikes. In current circumstances the prognosis is not comforting.*

In 1989 the US National Petroleum Council presented its report on the petroleum supply system to the Secretary of Energy. The report described the system as being very robust. In one of the scenarios presented, it dealt with a 4.5 mb/d import shortfall lasting three months. In another, it coped with the loss of the Explorer products pipeline for a month, and in yet another with the worst weather for fifty years. In all circumstances, the consumer is apparently protected by the interconnectability of the system, combined with the efficiency of the market and the cushion provided by the Strategic Petroleum Reserve (SPR). The report recommended a rapid and massive use of the SPR in the event of severe disruptions, and in all cases minimum regulation of the market.

This is one authoritative view of the security of the system in case of disruptions, and is consistent with the relaxation induced by a long period without serious supply problems. However another less optimistic view has begun to surface, suggesting that the flexibility of the system should not be taken for granted. This view has been reinforced by the difficulties experienced during the last US heating oil season. In December 1989 there was a week-long cold snap throughout the south and east of the country. With increased demand combined with disruption of refinery operations, a series of spectacular price spikes for propane, gasoil, jet fuel and gasoline ensued. This led to a public outcry and to the setting up of a considerable number of state and federal inquiries. Although not all the commissions have yet reported, some interim and final reports draw a preliminary picture of what went wrong. The spikes are attributed in these reports to the physical rigidity of the supply system, low levels of inventories and the behaviour of futures markets. They elicit calls for the establishment of publicly-owned petroleum product reserves at the regional level (the SPR contains only crude), price regulation during disruptions and the setting of minimum inventory levels. Faith in an efficient and virtually frictionless system has been shaken. More importantly, some of the reports noted that privately-owned stocks for petroleum products were below the socially optimal level.

The capability of the system to respond to a crisis is now likely to be tested. We are aware that the International Energy Agency (IEA) considers that the system is protected by high inventory levels. This can be termed the myth of the inventory security blanket, and it is this which has caused a degree of complacency. Our view is that the problem needs to be looked at in a less superficial manner, distinguishing between crude oil and products, public and private stocks. The ability of the oil supply system to

respond to a crisis depends not only on stocks but on the flexibility of the refining industry, as well as the economic behaviour of inventory holders. Furthermore it is important to avoid the fallacy of aggregation and to distinguish among other things between crude oil and product stocks, and public and private behaviour. In the following sections we look in turn at issues relating to (1) the adequacy of private stocks, (2) refining constraints and the flexibility of the downstream system, and (3) the role of public stocks.

### **Are Private Stocks Adequate?**

Table 1 shows the absolute level of private US inventories of crude and products and the number of days of supply in the first week of August from 1977 to 1990. The days of supply are simply absolute inventories divided by the prevailing level of demand, and superficially they appear to be satisfactory. Crude stocks are higher than before the Iranian crisis and while there are lower stocks for some products, forward days of sale appear to be quite adequate.

However, this calculation of days of sales available neglects to account for that proportion of inventories which is tied up in the distribution system, for instance as pipeline fill or in refinery equipment or tank bottoms. Added to this there is a minimum level of working inventories necessary to keep the distribution system functioning normally. While these inventories could ultimately be recovered, albeit at above the marginal cost of new supplies, they should not be regarded as immediately usable.

These elements add up to the minimum operating inventory, i.e. the level needed to maintain smooth operations. Below this level runouts are liable to occur and shortages might appear in the distribution system. Estimates of minimum operating inventory levels in the USA are made and updated by the National Petroleum Council. When these stocks are excluded the implications of Table 1 change. The available days of sale before distribution shortages can be expected are shown in Table 2. These figures show that there is only a single day's immediately usable gasoline inventory. This will clearly be inadequate if demand surges with panic buying. The regional breakdown of immediately usable inventories in the USA (by the five Petroleum Administration for Defence Districts, i.e. the East Coast, the Gulf Coast, the West Coast, The Rockies and the Mid-West), is equally disturbing. For example, on 3 August 1990, the West Coast had 27.9 mb of gasoline inventories, of which 27 mb constitute the minimum operating level. The latest in a series of warning signs occurred as recently as mid-July, when cargoes of prompt gasoline became virtually unobtainable on the West Coast.

So the situation in the USA is not as straightforward as the published stock levels might suggest. What then of the international situation? The most quoted and influential data are compiled by the IEA and published in its Monthly Oil Market Report. The view from the IEA is that stocks on land (given as amounting to 151 days of net oil imports for the eighteen oil importing OECD countries), currently provide greater cover compared to previous supply disruptions. Compared against forward consumption, stock cover is assessed at 99 days for the OECD, "a level which has only been exceeded in 1980-82 in the aftermath of the Iranian revolution".

Table 1 : US Private Stocks At Start of August 1977-1990

Date	Stocks in Million Barrels				Days of Sales			
	Crude	Gasoline	Gasoil	HFO	Crude	Gasoline	Gasoil	HFO
1977 (5 Aug)	342	251	209	69	23.4	34.9	70.6	61.6
1978 (4 Aug)	336	217	181	76	22.8	29.2	62.9	57.8
1979 (3 Aug)	320	236	167	82	21.8	33.6	65.7	69.3
1980 (1 Aug)	374	266	214	84	28.7	40.0	81.8	56.7
1981 (7 Aug)	385	232	194	74	29.8	34.7	73.5	63.4
1982 (6 Aug)	354	226	151	56	29.8	34.1	58.6	44.0
1983 (5 Aug)	344	226	129	48	28.3	32.5	51.9	34.0
1984 (3 Aug)	352	236	125	50	28.4	33.2	56.6	32.8
1985 (2 Aug)	325	229	117	41	27.0	31.7	48.7	23.3
1986 (1 Aug)	341	223	117	40	25.7	29.9	54.6	17.4
1987 (7 Aug)	323	229	115	41	24.2	31.3	34.8	14.5
1988 (5 Aug)	348	213	119	40	25.3	28.2	34.8	13.3
1989 (4 Aug)	333	226	114	42	24.1	29.3	34.0	13.6
1990 (3 Aug)	380	218	119	45	26.6	28.1	38.0	16.1
1990 (10 Aug)	376	212	119	46	26.4	27.3	38.1	16.5

Source : API

Table 2: Days of Usable Stocks in the USA at Prevailing Consumption

Date	Crude	Gasoline	Gasoil	Heavy FO
1977 (5 Aug)	2.7	5.0	28.5	8.1
1978 (4 Aug)	2.4	0.2	19.4	12.3
1979 (3 Aug)	1.4	3.0	16.5	18.9
1980 (1 Aug)	5.7	7.6	34.1	16.3
1981 (7 Aug)	6.6	2.6	26.1	12.0
1982 (6 Aug)	5.2	2.8	13.9	4.5
1983 (5 Aug)	4.9	3.7	9.8	5.4
1984 (3 Aug)	5.2	5.0	11.0	8.0
1985 (2 Aug)	2.8	3.8	8.4	3.1
1986 (1 Aug)	3.5	2.6	11.0	2.5
1987 (7 Aug)	2.0	3.4	7.9	3.2
1988 (5 Aug)	3.5	1.1	10.1	3.4
1989 (4 Aug)	2.4	2.8	8.7	3.8
1990 (3 Aug)	5.6	1.7	10.9	5.4
1990 (10 Aug)	5.3	1.0	10.9	5.8

The IEA figures are for total stocks, both crude and products, both private and public. Of course if the addition of all the elements produces a large number, this does not necessarily mean that supply of all products in all locations is totally secure, and the figures take no account of minimum operating inventory requirements. But let us examine the IEA figures, unfortunately only produced quarterly, to see if there has been an inventory build-up that will help to insulate the OECD from the crisis.

Table 3 gives the IEA figures for Japan, Europe, North America and Total OECD for the last four years in millions of tonnes. We have added figures for the US and Japanese SPRs and corrected the OECD total accordingly. This still leaves some 32 mt of government-owned stocks in the adjusted OECD total for which full quarterly figures are unavailable, 26 mt controlled by the German EBV, 2 mt each in Holland and Denmark, 1 mt in Italy and small amounts in Austria and Sweden. Over 1990 to date there has indeed been a stockbuild of 9.6 mt which runs counter to the usual pattern from first to second quarter. However major stockbuilding has been confined to North America, with an increase of 9.7 mt. Further, once the Japanese and US SPRs are excluded, as shown in the last column, the total level is below others achieved over the last four years.

The major assumption behind a belief in inventory levels being a stabilizing factor is that in times of crisis private stocks will inevitably be used to cover the immediate supply disruptions. The role of inventories in economic theory is a combination of two factors. First, there is a desire to smooth production if marginal costs are non-constant, which will lead to the traditionally assumed counter-cyclical behaviour of stocks. However there is a second motive, the desire to avoid stock-outs (a situation in which a trader cannot physically complete a transaction). When demand cannot easily be backlogged, as is the case in petroleum markets, the cost of failing to meet a unit of demand will normally be higher than the incremental cost of holding inventories. The result will be that stocks rise during a crisis. This is a perfectly normal phenomenon, as no company ever wishes to lose customers. After all, in a drawn-out crisis it is wise to make allowances for the possibility of the situation worsening. The empirical evidence in petroleum as well as many other industries is that the stock-out motive in inventory decisions dominates the production smoothing motive. Of course if there were to be any speculative behaviour on the part of inventory holders, including final consumers, this would certainly reinforce the tendency for stocks to rise.

In short, private inventories may very well climb, and so instead of narrowing the immediate supply shortfall they will widen it. Add to this the hoarding motive in final consumer stocks which registers in the data as a demand surge, and the IEA's security blanket may prove to be more akin to the emperor's new clothes.

Therefore, if private stocks may not necessarily ameliorate the situation, either in the USA or the rest of the world, we are left to rely on the flexibility of the downstream system and public (particularly stockpiling) policy. We now consider each in turn.

Table 3 : Stocks on Land of Crude and Products (IEA) Millions of Tonnes

	Europe	North America	Japan Total	Japan SPR	US SPR	N. Amer -SPR	OECD	OECD -SPRs
1986								
Q2	138.6	202.7	65.5	20.7	67.2	135.5	412.8	324.9
Q3	146.0	208.7	65.9	20.7	67.9	140.8	426.1	337.5
Q4	157.6	218.1	70.4	20.7	68.6	149.5	451.8	362.6
1987								
Q1	154.0	214.1	68.0	20.7	69.4	144.7	442.1	352.0
Q2	144.3	210.6	67.1	19.6	70.3	140.3	428.5	338.5
Q3	147.9	207.6	69.4	19.6	71.6	136.1	430.9	339.7
Q4	160.3	216.2	69.6	19.7	72.2	144.0	451.8	359.9
1988								
Q1	159.4	218.2	71.9	21.4	73.2	145.0	455.3	360.8
Q2	150.0	212.9	69.9	22.1	73.6	139.3	438.3	342.6
Q3	154.1	217.6	74.3	22.1	74.4	143.2	451.8	355.3
Q4	158.4	220.0	74.5	22.5	75.1	144.9	459.2	361.7
1989								
Q1	153.3	216.8	71.9	24.5	75.7	141.1	447.5	347.3
Q2	150.4	212.2	73.8	24.6	76.5	135.7	442.3	341.2
Q3	151.8	218.5	74.3	24.6	77.9	140.6	450.2	347.8
Q4	158.0	223.4	76.1	25.5	78.3	145.1	463.8	360.0
1990								
Q1	155.7	213.4	77.1	26.7	78.3	135.1	452.5	347.5
Q2	155.6	223.1	77.5	27.0	78.7	144.4	462.8	357.1



## Refining and Supply of Petroleum Products: Can the Downstream Cope?

The prevailing consensus view arising from a period without major disruptions is that the overall supply system has sufficient flexibility to cope with and swiftly remove any supply/demand mismatches in defined geographic areas, and thus to mitigate the effects of a disruption. The conventional view maintains that primary inventories above minimum operating requirements are available in any area, and faith is laid in the ability of price-driven dynamics to redirect products from one geographical area to another in case of a stock draw-down. Imports of finished products can help to correct temporary imbalances in the system, while refineries may increase their output to meet a demand surge. Prices, it is stressed, play a critical role in the process by providing the financial incentives and justification for shifting supplies to affected areas.

A major assumption of this view is that there will be no constraints in the downstream. Thus any disruption is essentially about crude oil: so long as crude oil supplies are maintained, there will be few problems in the market for products.

Nevertheless, there have been considerable changes in the structure of the industry over the course of the 1980s. In particular while demand has begun to increase again in several major countries, refining capacity has continued its downward trend. Thus the structural amount of spare capacity that can be invoked to deal with shortages has been much reduced in recent years. Furthermore, in a number of countries capacity utilization has risen to very high levels in the past months because of improved refining margins and other conjunctural factors. This means we are starting from a position which is less favourable than generally assumed. We illustrate these general trends below.

The trends in demand patterns over the 1980s are shown in Table 4, which demonstrates the scale of the movement of consumption towards the lighter end of the barrel. Despite improvements in engine design and other conservation measures, the glut of cheap oil and a generally increased demand for transport has led to gasoline consumption in the first quarter of 1990 being higher than in 1981 in all six countries shown. While the demand for residual fuel oil has contracted, and only Japan has significantly increased consumption of gasoil, for the six countries combined the total demand for petroleum products has increased over the last decade. But the geography of dependence has altered considerably. Whereas France, Germany and Italy have experienced falls in total demand, Japan the UK and the USA have had a, mainly gasoline led, demand increase. Indeed, for all the countries shown the vulnerability to supply squeezes has moved firmly towards the top of the barrel.

If enough spare capacity of the right kind exists (mainly upgraded refinery capacity), no problems need occur. Table 5 shows the trends in refinery capacity and utilization over the last decade. In all six countries the falls in refinery capacity are such that, regardless of whether spare capacity still exists and any consideration of the composition of the product barrel, the demand to maximum possible supply ratio has fallen. This is reflected in the increases in average refinery utilization rates, shown as quarterly averages for the second quarter of each year, with Germany at 95 per cent utilization in 1990, the UK at 89 per cent and the USA at 86 per cent. This means that

Table 4 : Demand (1st quarter, thousand metric tons a day)

Gasoline						
	France	Germany	Italy	Japan	UK	US
1981	40.5	60.3	31.0	69.4	49.4	729.2
1983	42.1	62.1	30.3	68.7	51.5	749.2
1985	39.5	61.3	30.5	70.4	51.8	760.1
1987	41.0	64.4	30.6	73.1	56.0	780.0
1989	43.6	69.6	33.1	77.9	63.3	836.9
1990	43.2	71.4	34.8	84.5	65.9	838.2
Gasoil						
	France	Germany	Italy	Japan	UK	US
1981	134.0	153.6	82.9	110.5	53.3	425.3
1983	114.9	142.2	74.2	105.7	52.6	356.7
1985	126.8	135.4	92.1	116.1	57.9	413.7
1987	116.5	153.4	99.0	126.4	53.6	402.9
1989	114.3	108.5	87.9	147.8	53.1	421.9
1990	112.3	127.9	83.5	158.8	55.5	409.2
Residual Fuel Oil						
	France	Germany	Italy	Japan	UK	US
1981	66.0	53.7	126.5	201.9	52.7	312.1
1983	41.9	37.4	104.6	155.6	39.7	211.9
1985	30.4	33.4	88.1	138.6	103.1	159.2
1987	28.5	30.0	89.5	114.9	29.9	171.5
1989	25.0	19.4	85.8	123.1	31.9	193.7
1990	24.1	18.7	85.8	124.8	35.8	163.9
Total Petroleum Products						
	France	Germany	Italy	Japan	UK	US
1981	285.2	314.9	272.5	654.3	188.4	1829.0
1983	243.8	285.3	235.6	582.8	187.2	1761.0
1985	239.7	278.4	237.8	591.6	256.5	1815.0
1987	234.9	292.1	251.5	584.9	188.1	1864.9
1989	235.9	254.3	245.0	653.1	198.8	2000.8
1990	231.0	276.1	240.2	685.7	209.4	1940.8
% change						
1981-90	-19.0	-12.3	-11.8	4.8	11.1	6.1
Source: IEA						

Table 5 : Refinery Capacity and Utilization

	Refinery Capacity (mb/d)							% change 81 to 89
	1973	1978	1981	1983	1985	1987	1989	
France	3.17	3.45	3.23	2.37	2.18	1.90	1.70	-47.4
Germany	2.92	3.09	2.96	2.28	1.75	1.65	1.57	-46.9
Italy	3.79	4.21	3.99	3.37	2.59	2.48	2.31	-42.2
Japan	4.82	5.29	5.68	4.98	4.98	4.57	4.20	-26.0
UK	2.83	2.52	2.36	2.11	1.87	1.82	1.81	-23.5
USA	14.30	17.38	18.29	15.87	15.46	15.57	15.70	-14.2

Source : BP

	Refinery Percentage Utilization (Second Quarter)					
	1981	1983	1985	1987	1989	1990
France	56	51	56	62	70	72
Germany	54	56	70	82	85	95
Italy	47	46	44	57	55	66
Japan	59	54	58	55	63	71
UK	55	68	72	80	87	89
USA	69	67	78	82	82	86

Sources : API, Petroleum Argus, Petroleum Association of Japan

spare capacity in these countries is at a particular premium. The situation at the time of the Iraqi invasion was even tighter than these numbers imply, since utilization reached 94.6 per cent in the USA for the last week of July.

While the tightening of refining constraints is generalized, the USA would appear to be the most vulnerable to localized shortages given the nature of its distribution system. The US market is in fact an assembly of very distinct regional markets, and the flexibility of the supply system as a whole is not only a function of the absolute and relative levels of crude and products inventories, but also of a number of elements such as refinery capacity, configurations and location, crude sources and deliverability, utilization rates and physical distribution of storage capacity, and the actual availability of options to redirect quantities in case of localized disruptions. The configuration of the pipelines in place, for example, might seriously limit the possibilities of diverting supplies to a particular area in case of a localized shortage, so that the existence of even substantial usable stocks in nearby locations might prove de facto useless to relieve the pressure. And once a product is on its way in the pipeline it is committed to a geographic area, with a very limited schedule of delivery options.

The East Coast, for example, is entirely dependent on crude imports from abroad for its local refining operations, and depends for over 50 per cent of its product consumption on deliveries from the Plantation and Colonial pipelines running north from the South Central States. In the Greater Midwest, the bulk of gasoline, kero-jet and distillates is supplied by local refinery production, fed by crude of which more than half is shipped by pipeline from the Southern Central states. Therefore, although the East Coast, the Greater Midwest and the US Gulf Coast can be viewed to some extent as integrated markets, with the Southern Central States shipping substantial volumes of crude to the Midwest and products to the East Coast, it is also true that the number of possible "combinations" is restricted and that at any given time the available options for solving a localized problem are limited. This is all the more true for the West Coast, which is a virtually separate market fed mainly by the substantial flow of Alaskan oil. The relatively poor quality of ANS crude (26.7 API) accounts for the peculiar pattern of product supply and disposition in this area. Its local use means that West Coast refineries have the lowest gasoline and distillates yield, and the highest yield of residuals (14 per cent) in the whole country. In turn, this means that the West Coast is dependent on imports and on shipments from the US Gulf and the Rockies for its marginal barrel of gasoline and distillates, while it can export over a third of its residual fuel oil.

Indeed all the main indicators point to an increased fragility of the supply system, which would be cause for concern regardless of developments in the Gulf. As we have already seen, US refiners have had to meet a growing demand for gasoline over the last ten years. What is more, the regional breakdown of these increases shows that the fastest growing areas for motor gasoline and distillate fuel oil demand are the West Coast and the East Coast, a pattern which raises more questions about the ability of the system to cope. How is the West Coast, virtually isolated from other US markets, going to deal with increased demand for the lighter end of the barrel, when its whole system is geared to the supply of heavier products? And to what extent is the refining industry, already stretched to its maximum sustainable level of utilization, capable of accommodating this extra demand, especially when the construction of new refineries is pushed more and

more into limbo by the pressure of environmental concerns?

In the early 1980s high carrying costs, weakening prices and declining demand provided refiners with the incentive to hold less products and more crude stocks relative to demand, and to adopt a strategy of meeting incremental demand increases with higher crude runs, rather than from product storage, thus maximizing inventory turnover and minimizing tankage and inventory. In spite of the unquestionable improvements in monitoring systems and techniques, the fundamentals have changed and yet stocks are still low. Replacing stocks with information and linear programming is not the answer.

In short, the chances of a products squeeze particularly for gasoline are very high in the USA, and gasoline would be where any squeeze would first affect Europe. We have already seen how derisory the level of usable stocks really is, and how stretched refining operations already are. We can expect very little more output. Refineries are on summer gasoline yields so there is little leeway left in biasing production to the lighter end of the barrel, and what leeway there is only stores up problems for the heating oil season.

The usual counterargument is to say that the US gasoline season is coming to an end and as demand tails off, so will the chances of a gasoline price spike be reduced. However, gasoline demand is not as seasonal as is often believed. Table 6 shows the levels of daily demand for products by month in the USA for 1989. After the August peak, demand only fell back by about half a million barrels a day until the end of the year. Taken over the last three years, the fall in gasoline consumption in the last quarter compared to the third has been less than 2 per cent, as shown in the section of this report on Petroleum Products: Prices and Demand. This is not enough to obviate the spike, and would be overtaken by any panic buying or other demand surge. Indeed, early indications from traders are that US gasoline demand in the second week of August reached an all-time high of 8.7 mb/d, as some consumers filled their tanks in fear of rising prices (*Oil Daily Energy Compass*, 17 August). All the signs are therefore that a demand surge has already started. Furthermore, the gasoline market is very different now from the time of previous shocks. The presence of four grades (leaded, unleaded ron 87, 92 and 93), has greatly complicated the distribution system. There are for example two pipelines running between San Francisco and Los Angeles flowing in opposite directions, one carrying leaded gasoline and the other unleaded. Even in areas where generalized shortages are avoided, grade specific shortages are probably inevitable. Our view is that either gasoline prices will hit a series of spikes, or companies will have to bear losses to avoid public criticism. Indeed many conditions were in place for a gasoline price spike even if the Gulf crisis had never happened.

There are also problems with fuel oil. Preparations for the seasonal demand surge for fuel oils in December were less than adequate last year. This year the prognosis is even blacker. A spike looks very likely even if all refineries remain operational. The experience of recent years has shown how sensitive spot markets are even to individual refinery problems, let alone a generalized fall in utilization. If we add a probability for the refinery problems of the latter part of 1989 to repeat themselves, the situation worsens markedly. Product prices may then be set for a roller coaster ride.

Table 6 : US Demand By Month 1989 mb/d

	Gasoline	Gasoil	Heavy FO
January	6.7	3.3	1.6
February	7.1	3.4	1.7
March	7.4	3.4	1.6
April	7.2	3.0	1.4
May	7.4	3.0	1.1
June	7.8	3.0	1.2
July	7.3	2.6	1.3
August	7.7	3.0	1.1
September	7.2	2.9	1.0
October	7.3	3.1	1.3
November	7.4	3.3	1.2
December	7.4	3.9	1.9

Source : US EIA Monthly Energy Report

### The Strategic Petroleum Reserve and the IEA Oil-Sharing Agreement

One does not have to go as far as Philip Verleger (*Petroleum Intelligence Weekly*, 13 August 1990) to see that the International Energy Agency and in particular the US Department of Energy (DOE) have not made any decisive impact since the crisis began. Verleger even questions the continued existence of the DOE due to what he considers its incompetence and lack of understanding of oil markets,. What has the DOE done to incur such wrath, and more importantly will the SPR pumps ever be used?

The SPR consists of over 580 mb of assorted crude stored mainly in six solution-mined salt domes in Texas and Louisiana. The mere presence of this reserve betrays the fundamental ambiguity and contradiction in US energy policy, but a contradiction that is not solely American. To build a public stockpile is an admission that the free market can not adequately cope in crisis situations, with the implicit assumption that either private stockpiling behaviour results in inventories falling below the socially optimal level in abnormal circumstances, or that inventories may not be released. Even to

contemplate using the SPR is further interference in the market, changing expectations and adding to uncertainty if the timing and scale of any release are not transparent to market participants. The line taken by the DOE to date reflects the schizophrenia induced when economic philosophy meets disruption realities and expediencies head on.

On the one hand the DOE has hidden behind the myth of inventories. The SPR is not considered to be needed yet because private stocks are high and the free market should not be interfered with. But as we have seen, private stocks are in reality not very high and there are constraints on expanding production. Further if we take the wish not to interfere with the free market to its logical conclusion, then the salt domes should be sealed permanently. On the other hand, the calls for price restraint from President Bush and the DOE to the industry, with the underlying threat of regulation, and the immediate setting up of commissions to investigate recent price hikes, are not indicative of a desire to let the free market operate. It is this inherent ambiguity in policy which makes any prediction of the future use of the SPR difficult. Quite simply, not even the DOE is certain yet, and this is not helping to stabilize markets. It is easy to understand why Verleger has taken such pique. The problem arises because supporters of unconstrained markets in normal times naturally find it difficult to make the transition to an overtly interventionist stance during a crisis.

The situation would be clearer if the SPR had a built-in trigger to activate its use. While it is normally assumed that the IEA trigger of a supply loss of more than 7 per cent of world demand would lead to a SPR draw-down, for a supply loss below this level there are no certainties. Under the provisions of the Energy Policy and Conservation Act (EPCA) the rundown of the SPR is allowed if the president rules that the use of reserve is necessary to counteract a "severe energy supply interruption". This is defined as a supply shortage which, in the eyes of the president, is likely to be of sufficient size and duration to cause an emergency, may threaten national security or the economy, or results from an import curtailment, sabotage or act of God. This basically implies that the president has *carte blanche* to do more or less what he wants with the SPR, and in particular is certainly not confined to ordering a draw-down of the SPR only under the US obligations to the IEA.

There is then no built-in or obvious trigger mechanism for activation, and this was a source of controversy during its planning stage and later, as it was felt in some quarters that the effectiveness of the SPR would be hampered by political delays and lack of expertise. The other major controversy was the dispute over the establishment of a Regional Petroleum Reserve (RPR) of fuel oil kept on the East Coast. The provision of these reserves was removed from the original EPCA by President Carter, mainly on cost grounds, much to the fury of East Coast senators and against the advice of the SPR office. That office felt that in times of disruption there might be insufficient refining capacity to cope with SPR oil, and product shortages would result, particularly in heavy fuel oil which is not carried in any product pipelines. While the loss of the RPR provisions may prove to be regrettable in retrospect, it is true that in the mid 1970s, when there was considerable underutilization of refining capacity, the criticism from the SPR office may have seemed unconvincing. The RPR at that time appeared to be a high-cost scheme with only short run political benefits.

The USA may now bear the cost of the uncertainties and disputes associated with the launch of the SPR programme. The major problem with the early debate and establishment of the SPR was that it paid little or no attention to the practicalities of draw-down situations, hence the absence of any effective trigger and details of precisely how and when the SPR will be used. With hindsight the reliance on a solely crude-based reserve, confined to Texas and Louisiana, may be a riskier strategy than was first envisaged. Quite simply, faced with what was considered to be a low probability scenario, the contingency plans have yet to be proved adequate.

What then do we know about the mechanics of a draw down? A reasonable picture can be gained from the DOE's most recent statements and the annual SPR inventory reports. The maximum draw-down capacity is claimed to be 3.5 mb/d sustainable for a period of three months after which the rate tails off. As the SPR draw-down procedure has never been fully tested except in its auction bidding by companies stage, there is no check on whether such rates are technically feasible. We can merely point out that the DOE's standing has been shaken enough during the crisis to lead some members of Congress and the US press to express scepticism at the 3.5 mb/d figure. It will officially take sixteen days from a presidential order for the first SPR crude to reach the market, with the full rate being achieved after thirty days. Allowing for the bidding process, transportation to refineries, refining and transport to end consumers, it will take well over a month for the refined SPR to reach the consumer.

The SPR sites are arranged in three groups named after the interstate pipelines they draw from, namely Seaway, Texoma and Capline. In the event of a draw-down the only pipeline connection out of the Southern refinery area is through the Capline pipeline to Mid-Western refineries. The maximum draw-down along this route is 0.7 mb/d. All three groups have access to facilities for loading onto barges and tankers at the maximum combined rate of 2 mb/d. With the maximum draw-down for Southern refineries being 1.8 mb/d, there is some flexibility in allocating the 3.5 mb/d across the three potential outlets.

This leaves the problem of how to get SPR crude to the West and East Coast. The difficulty is that with no major crude pipelines running from the US Gulf to either coast (the Colonial and Plantation pipelines are for products), only two possibilities remain. First, the US Gulf and Mid-West refineries could take the SPR oil and supply the rest of the USA with products. However, as noted above, US Gulf and Mid-West refineries are already operating at an historically high level of utilization, leaving little spare capacity to increase their supply to other areas. This was precisely the fear of the SPR office in the mid-1970s when the idea of removing provisions for the RPR was first mooted. In addition, there is the problem of the poor petroleum transport links between the West Coast and the rest of country. To reactivate disused refineries takes a very long time and the damage will have been done long before it is achieved.

The only remaining possibility is therefore a rerouting of crude movements, diverting imported oil from the US Gulf to the East Coast. The West Coast with its reliance on Alaskan crude is less likely to suffer a shortfall, although it may need to increase crude runs, as far as capacity constraints allow, in response to any product demand surge - in which case Alaskan transfers can simply be switched to go to the West



Coast rather than continuing to the US Gulf. If these logistics fail internal tanker movements are needed, but then the Jones Act prohibiting internal movements of crude and products by non-US flagged tankers, becomes a major constraint.

However, let us assume that 3.5 mb/d of SPR crude is being efficiently transported to refiners. This does not represent the end of the potential problems. The SPR is about two-thirds sour crude, according to the SPR inventory. US refiners with operations geared to primarily sour crude are rather thin on the ground in those areas that the SPR will reach. Refiners are unlikely to know much about the quality of the various SPR blends until auction, and it will not necessarily be easy for them to change operations accordingly. Also, if product shortages bite at the lighter end of the barrel the cracking capacity may not be there to produce the desired yields from the relatively heavier SPR crude.

In 1989 the NPC sent questionnaires to refiners to assess their attitude to the SPR. The replies are illuminating. Refiners overwhelmingly supported early release of the SPR, and were particularly concerned that the auction process is not confined solely to refiners or agents already established as refinery suppliers. Apart from the Wall Street refiners bidding up prices, refiners fear that speculation and inexperience in the auction for SPR crude will add further delays to an already cumbersome procedure. The SPR is not therefore necessarily a panacea.

The other possibility for governmental action other than through public stockpiles or direct regulation is the International Energy Agency and its oil-sharing agreements. The indications are that these are unlikely to be brought into operation unless the situation in the Gulf worsens. In its meeting of 9 August IEA Chairman Ulrich Engelman's line was predictable, forward stocks at 100 days of world consumption are ample, and since the IEA does not expect a physical shortage of crude it will not invoke oil-sharing measures. The entire rise in prices was put down to "typical speculation reacting to a negative situation in the Gulf". Oil sharing is actually a highly political issue. There are inevitably gainers and losers, and the scheme overall produces a net financial loss. It has been calculated that at 1983 prices the scheme leads to a net loss to the USA of \$1.05 per capita in the context of a 7 per cent supply shortfall. The UK loses \$4.02 per capita, Italy \$4.90, Canada \$16.81 and Holland \$17.06. The major gainers are Germany, \$3.72 per capita and Switzerland \$4.70. While the numbers input to the IEA oil-sharing equation have obviously changed, if the above figures are inflated to 1990 prices one can see why many countries may be rather cautious about the activation of IEA oil sharing. In general, not only is the trigger unlikely to be pulled but it seems the IEA has not yet even found the safety catch.

Turkey's experience after the severe curtailment of its imports at the onset of the Iran-Iraq war is salutary. The IEA provisions allow for oil sharing if a loss of 7 per cent of demand is suffered by the world or by any one of its members. Turkey was well over this threshold. However by the time anything had been agreed the Turks had turned to the spot market in exasperation at being offered oil of the wrong quality or at rates above the spot market. In short, if the cavalry come they will certainly not ride out of Paris.

## THE IMPLICATIONS FOR ENERGY EFFICIENCY

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*The oil price shocks of 1973 and 1979 provided the impulse for significant programmes of research and action to reduce dependence on and consumption of oil throughout the market economies of the industrialized world. Both energy efficiency and energy conservation (as well as energy switching) were put centre stage on the political agenda and, as is well known and documented, enormous energy savings began to be made. Between 1973 and 1985 oil use in OECD countries fell 15 per cent or 6.1 mb/d; total energy use per capita fell 6 per cent while per capita GNP increased 21 per cent. Some countries made particularly spectacular savings: a 6 per cent reduction in per capita energy use in Japan was accompanied by a 46 per cent increase in per capita GNP.*

Will the present crisis in the Gulf provide the incentive for a renewed drive toward energy efficiency? Will the current price hike be of sufficient amount and duration to encourage further savings? And if it is, what capacity is there in both the medium and the long term for increasing energy efficiency?

One view is to say, no, there is little likelihood of renewed interest in energy efficiency; the necessary impulses are lacking. The supply situation today is very different. More countries are producing oil and there is in general improved production capacity. Most of the 5 mb/d flowing from Iraq and Kuwait can be made up in both the medium and long term by additional supplies from both OPEC and non-OPEC producers. In the short term there is a lot of oil around in tankers, company stocks, SPRs etc. Regarding products, there would be problems but these would be limited. Unlike the 1970s and early 1980s there is not the same background of fear and doom mongery about scarcity. With regard to price, the order of magnitude of the increase so far in the present crisis is nowhere near that of either 1973 or 1979. The price of oil is now being controlled by complex

market mechanisms rather than by OPEC directly. Moreover, considerable energy savings have already been made and there has in recent years been a steadily increasing complacency as well as consumer indifference regarding energy efficiency. Public attitude is unlikely to change overnight.

The other scenario, however, which we think more likely is that the consuming nations will indeed move toward revived policies of energy efficiency. The same complacency just mentioned with regard to energy consumption has led to a slowing if not worrying reversal of the rate of decline in energy intensity in recent years. There has been a return to short-term interests; oil imports are up; energy bills are high and increasing. In this context, Saddam Hussain's invasion of Kuwait has revived nagging fears about supply security and set the alarm bells ringing for the importing nations - as is evident from the US response to the invasion. If the crisis develops as is now expected there will undoubtedly be supply imbalances and disruptions. Products availability will not be assured. Prices will rise further and one wonders at the ability of the new market mechanisms to contain the situation. Moreover, while the price hike as yet

does not compare in terms of magnitude or real amount to the increases of the 1970s, it is nevertheless a shock in context of the relative glut and sense of comfort of recent years. The psychology of the present increase rather than the actual amount could be the more important point to bear in mind when assessing the possibility of a change in policy. The vision of further price rises through the decade will merely compound matters. We believe that the consumer nations have been jolted into a new era of overt interventionist energy strategies. The crisis in the Gulf will encourage a return to longer term energy policies than those seen in recent years, with a clear mapping in of conservation and efficiency tools.

The political and economic incentives for energy efficiency will be fuelled this time round by the new public consciousness about such energy related environmental issues as acid rain, urban pollution, photochemical smog and global warming. Pressure is mounting on governments worldwide to do something; national and international meetings on the plight of the planet proliferate; there is increasing consensus on the need for action. In other words, the environment has been forced to centre stage on the political agenda. Given the fact that calls for a reduction in energy consumption now lie at the heart of all proposals to prevent further environmental degradation - particularly in context of concern over global warming where all the recommendations revolve about stabilizing levels of CO<sub>2</sub>, an inevitable by-product of fossil fuel combustion which cannot be controlled by any technical fix measure - it is likely that environmental lobbyists and other concerned bodies will ride hard on the back of the current crisis to increase their calls for improved energy

efficiency. The oil war has provided additional ammunition for their fight - and governments might be more willing to appear to listen to their calls now: a move towards increased efficiency would satisfy an increasingly vociferous electorate, fulfil their own green rhetoric (a credibility gap has already developed with regard to what is being said and what is being done), while answering their own economic, security and psychological needs. In other words, there will be a meshing of "public" and "official" political interest: green lobbyists will ride on the back of governments, and governments will ride on the back of green lobbyists, both for their own ends - which happen to be the same end.

The potential to reduce oil consumption is considerable, despite the savings made over the last decade. This is particularly the case in the transport sector, the sector where concerns over both demand and the environment come most clearly and crucially together. It is the only energy sector in the OECD that has seen an increase in oil consumption post 1973 and it is arguably the largest, single source of global pollutants today. The ability to implement new efficiency standards relatively quickly, given that governments do intervene in the market and issue new mandatory guidelines, exists. Manufacturers have ready to go to market vehicles which substantially improve on present average fuel economy, vehicles which manufacturers themselves have referred to as "crisis vehicles" for which to date there has not been consumer demand. Leaving aside any grandiose schemes of producing passenger cars capable of achieving fuel economies approaching 100 mpg - technologically possible but nowhere near commercialization - medium-term targets of 45 mpg are more than

possible. Vehicles achieving 48-57 mpg are already in limited production; full production of the 45 mpg passenger car only requires between two and five years. An increase in the average fuel economy of US cars from 13.1 mpg in 1973 to 17.9 mpg in 1985 cut US gasoline consumption by 20 billion gallons a year, lowering oil imports by 1.3 mb/d. Raising new car efficiency standards to 45 mpg by 1995 would save another 1.9 mb/d. Whilst the USA provides particularly impressive figures given its lower starting point relative to other countries (average fleet efficiency in the US is 18 mpg compared to the mid 20s in Europe and Japan), savings in the transport sector could be made in the medium term through all OECD countries. Savings in other sectors, such as buildings, could also be substantial on the basis of current technology and energy management systems but would be over a longer time period. In general, the potential for increased energy efficiency is far from exhausted, and this conclusion applies even to Japan where the most extensive energy savings of any OECD country to date have been made.

The current crisis is happening in a new context. There are different dynamics at work to those of 1973 and 1979. The most important of these is the mounting concern, worldwide, for the environment. Whether or not public opinion responds to concerns about energy security, governments now have a window through which they can push - and will have accepted by their constituents - otherwise unpalatable interventionist policies. Energy efficiency is back on the agenda.

# **THE FIRST OIL WAR**

*Part 2*

## THE OIL BACKGROUND TO THE GULF CRISIS

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### The Background to the Invasion

*The Iraqi invasion of Kuwait in the early morning of Thursday, 2 August, came only hours after the failure of the delegations of the two countries to arrive at a settlement in their meeting in Jeddah, Saudi Arabia. The key charge made by Iraq was that Kuwait and the UAE had undermined the Iraqi economy by persistently producing more than their OPEC quotas. Kuwait was then singled out by Iraq under the pretext that it had "stolen" Iraqi oil worth \$2.4 billion from the Rumaila oilfield which straddles the border between the two countries. The border itself is subject to a long-standing dispute.*

By the time of the Iraqi invasion, the main bone of contention had already been removed. The price of the OPEC basket rose from \$14.0/b in June to \$18.0/b in the second week of July following the Jeddah meeting of the oil ministers of Saudi Arabia, Iraq, Kuwait, Qatar and the UAE, and the vitriolic attacks by Iraq on "overproducers in the Gulf". So it seems that while the main cause of the Iraqi invasion of Kuwait was the latter's oil policy, other factors, such as the debt, border and regional political issues, further aggravated the situation.

In this section we shall outline the developments in the oil policies of Kuwait and Iraq during the period leading to the invasion within the wider context of OPEC's production and price policies. We shall also discuss briefly the economic pressures on the two countries that have put them on a collision course, culminating in the invasion.

### The Recent OPEC Agreements

In the past three or four years, Kuwait and the UAE have often been reluctant to adhere to their quotas which, in some instances, represented less than half their production capacity, and in the case of

Abu Dhabi, as distinguished from the UAE as a whole, less than one third of capacity. In the November 1989 meeting of OPEC, Kuwait was brought back into the fold with an increase in its quota from 1.149 mb/d to 1.5 mb/d while the UAE was exempted from abiding by its original quota of 1.095 mb/d. The OPEC output ceiling was raised from 20.5 mb/d to 22.0 mb/d. However it was stressed that overproduction by the UAE must not be taken by the other members as an excuse to renege on their commitments and overproduce. OPEC hoped that adherence to this new (higher) ceiling and quota distribution would lead to a cut in actual production which had averaged 23.3 mb/d in the last quarter of 1989. Despite the over-quota production, the price of the OPEC basket of crudes exceeded the reference price of \$18.0/b in November and December and almost reached \$20.0/b in January 1990 due to strong demand.

In the press conference following the Vienna meeting in November, the Kuwaiti Oil Minister, Sheikh Ali Khalifah al-Sabah, pledged a reduction of at least 500,000 b/d in the first quarter of 1990. It was suggested by MEES (4 December, 1989) that this cut could be implemented by reducing refining throughput in Kuwait from

800,000 b/d to 700,000 b/d, halting spot sales of crude estimated at 350,000 b/d (mostly to the US market), and substituting purchased North Sea crude for Kuwaiti crude in KPC's European refineries which could amount to 50,000 b/d.

The next ordinary OPEC meeting was scheduled for 25 May, but the failure to implement the cutbacks in production agreed in November had led to a fall in prices in January and February and prompted a series of meetings between the Gulf producers. The Iraqi President, Saddam Hussain, sent messages to the Heads of State of Kuwait and Saudi Arabia on 17 and 20 February, respectively, urging them to restrain their production and to keep prices above \$18.0/b. This was followed by a meeting in Kuwait between the oil ministers of Kuwait, Saudi Arabia and Iraq on 3 March at which commitment to the November agreement was reaffirmed. However differences emerged concerning long-term policies, with Iraq in favour of raising prices and Kuwait wanting to maintain the \$18.0/b target level.

Differences between the oil policies of Kuwait and Iraq were highlighted when the Kuwaiti Oil Minister declared that quotas were irrelevant from a practical point of view. He also said: "I think that our obligation to stay within the quota applies when the price of the OPEC basket is below \$18.0/b. If the price is above \$18.0/b, I think everyone should be, and even be encouraged to be, producing above quota." (*MEES*, 12 February 1990). It is interesting that President Saddam Hussain's messages to Kuwait and Saudi Arabia and the meeting between the oil ministers of the three countries in Kuwait came soon after this statement by the Kuwaiti Oil

Minister. In addition, Iraq's opposition to the abolition of the quota system was reiterated by its oil minister Isam al-Chalabi in an interview with the Kuwaiti newspaper *al-Qabas* (*MEES* 23 April 1990).

The average price of the OPEC basket fell in the first three months of this year from almost \$20/b in January to \$19.10/b in February and to \$17.75/b in March making the average for the quarter \$18.95/b. The decline in the price continued in April prompting oil ministers in the Gulf and the OPEC President (the Algerian Oil Minister) to express grave concern and announce an urgent meeting of the eight-member Ministerial Monitoring Committee (MMC) in Geneva on 2 May. This meeting was attended by all members and hence the ordinary meeting that had been originally scheduled for 25 May was postponed to 25 July.

In the MMC meeting in Geneva on 2 May, it was agreed to cut back total production to the ceiling of 22 mb/d agreed in November from the actual volume of 23.5 mb/d achieved in April. This implied a cut of about 1.5 mb/d, the bulk of which would be contributed by the UAE, Kuwait and Saudi Arabia. On the day after the MMC meeting both the Iraqi Foreign Minister, Tariq Aziz, and the ruling Ba'ath party newspaper *al-Thawra* issued warnings to those members of OPEC who had been overproducing, describing the overproduction as a "Zionist-imperialist campaign against Iraq".

Saudi Arabia was the first to implement the agreed cuts and this helped raise crude prices by \$1/b. However total OPEC production was estimated by the IEA to have declined only from 23.8 mb/d in April to 23.4 mb/d in May with

the bulk of this decline coming from Saudi Arabia. Consequently, the average price of the OPEC basket continued to fall in May reaching \$15.45/b. The price fell further in June reaching \$14.0/b implying that most Gulf crudes were selling for about \$12.0/b.

On 20 June, the Kuwaiti cabinet was reshuffled and a new figure, Dr. al-Ameeri, was appointed oil minister to succeed the veteran Sheikh Ali Khalifah al-Sabah. Despite rumours that the move of Sheikh Ali from the Oil to the Finance Ministry signalled a change in oil policy and was designed to appease Iraq, the new oil minister reaffirmed that there was no change in Kuwait's oil policy and, along with his UAE counterpart, informed the OPEC President of their countries' demands for higher oil quotas. Soon afterwards, Iraq stepped up its indirect verbal onslaught on Kuwait and the UAE for continuing to ignore their OPEC quotas. The Iraqi President sent urgent messages to the Heads of State of Saudi Arabia, Kuwait, Qatar and the UAE following which a meeting of the oil ministers was held in Jeddah on 10 July.

The pledges by Saudi Arabia, Kuwait and the UAE to cut production, coupled with Iraq's intense political pressure on these Gulf countries, had the effect of raising the price of the OPEC basket from \$14.0/b to \$18.0/b. However the statement by the new Kuwaiti Oil Minister on 16 July that the Jeddah meeting had agreed to raise Kuwait's quota in October may have been construed by observers, including the Iraqi President, that Kuwait was, yet again, not serious about cutting its production. The following day (17 July) was the anniversary of the Iraqi revolution and Saddam Hussain dedicated most of his speech to attacking

overproducers and accusing them of conspiring to undermine the Iraqi economy. The next day, the Iraqi Foreign Minister sent a letter to the Arab League accusing Kuwait and the UAE by name of plotting against Iraq.

The ordinary conference of OPEC met in Geneva on 26 July amid rising tension in the Gulf. Already Iraqi troops were massing on the border. The meeting endorsed the Jeddah accord of 11 July in which it was agreed to raise the quota of the UAE to 1.5 mb/d thus raising the ceiling to 22.491 mb/d. The meeting also reached a compromise on the minimum reference price and agreed to raise it to \$21.0/b despite Iraqi pressure to raise it to \$25.0/b. However Iraq's minimum price level was reached within a few days of its invasion of Kuwait.

#### **The Economic Pressures on Iraq and Kuwait Prior to the Invasion**

Kuwait has been demanding a quota of 2.0 mb/d for the past few years. One of the arguments put forward consistently by Kuwaiti officials is that the government has a large budget deficit and that the only way it could be financed is by raising oil production and hence revenues. However those who do not accept this argument point to the way the Kuwaiti budget deficit is defined and argue that if Kuwait's substantial investment income and its annual transfer of 10 per cent of its oil revenues are taken into account then the deficit will completely disappear or even turn into a surplus. The Kuwaiti government's reply to this is that it is bound by law to transfer 10 per cent of its oil revenues to the Reserve Fund for Future Generations and that the investment income from this fund cannot be used until the year 2001.



Kuwait's insistence on a quota of 2.0 mb/d and its refusal to abide by any lower quota assigned to it must be seen in the context of its domestic economic and political situation. Kuwait's oil revenues fell very sharply in 1982 when it took a large cut in its oil quota in order to defend high but falling oil prices. The same year saw the crash of the unofficial stock exchange known as Souq al-Manakh. The scale of this crash and the government's failure to resolve quickly the complex financial claims of the commercial banks on the private sector led to a severe slowdown in economic activity. In order to mitigate the impact of the Souq al-Manakh crash (and the Iran-Iraq war) on the private sector, the Kuwaiti government decided not to reduce its public expenditure despite the sharp fall in its oil revenues. This situation persisted for most of the 1980s and the consequent budget deficits had to be financed from the State General Reserve (SGR). This along with the loans to Iraq, exhausted the easily accessible financial assets leaving the SGR with only investments in Arab countries and loans to Arab governments, including those to the Iraqi government, which could not be liquidated.

Unlike Kuwait, Iraq could not increase its oil revenues by increasing its production. Moreover, a reduction in the price of oil caused by overproduction by Kuwait and other countries, or induced by any other factor, reduces Iraq's oil revenues. During the Iran-Iraq war Iraq's export capacity fell to about 1 mb/d given the earlier closure of the pipeline running across Syria and the damage inflicted on the al-Bakr export terminal in the Gulf. Consequently, the bulk of Iraq's oil exports had to go through its pipeline to the Mediterranean port of Ceyhan in Turkey. This pipeline was

later expanded to bring its capacity up to 1.65 mb/d. In addition, work started on the first phase of the Iraq Pipeline Trans-Saudi Arabia (IPSA) in October 1984 and was completed in September 1985. This gave Iraq an additional 500,000 b/d of export capacity. Work on the second phase of IPSA began in September 1987 and the project was formally inaugurated in January 1990 with a capacity of 1.65 mb/d. Iraq's third oil export outlet, the al-Bakr terminal in the Gulf, is being expanded from its current capacity of 800,000 b/d to 1.6 mb/d so that soon Iraq will have a total export capacity of over 4.8 mb/d.

Having exhausted and diversified its export capacity, Iraq found itself short of funds for raising its sustainable production capacity which is estimated to be in line with its current quota of just over 3 mb/d. During the war, drilling activity fell sharply, maintenance and workovers were naturally neglected, thus reducing Iraq's production capacity by over 1 mb/d from its pre-war level. Iraq apparently failed in its attempts to borrow in foreign capital markets the amounts for investments needed to repair and expand oil production capacity. Its already heavy debt burden and inability to meet its repayment schedule made further borrowing impossible. It also tried to attract foreign oil companies, mainly Japanese, to invest in the development of existing oilfields in return for long-term oil contracts. These attempts too seem not to have succeeded.

Iraq's desperate need for foreign exchange to finance its post-war reconstruction and frustration at not being able to maintain the level of its oil revenues, let alone raise them, have led it to accuse Kuwait and the UAE of plotting to undermine its economy.

## THE POLITICS OF THE LOW OIL PRICE POLICY

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Iraq's invasion of Kuwait followed a period of rising political tensions during which Iraq accused Kuwait and the UAE of causing it economic strangulation. The oil production policies of these two countries were singled out as having caused oil prices to fall and to remain low. Because Iraq was unable to increase its production beyond 3.0-3.2 mb/d due to severe capacity constraints, the detrimental effects on revenues of low oil prices could not be compensated for by attempts to increase export volumes.

There is no doubt that since mid-1987 Kuwait apparently favoured low oil prices as a policy which would serve best the long-term economic interests of OPEC member countries and other exporting nations. Kuwait's oil officials were very vocal on this issue. The arguments they put forward have now become familiar. Low prices would increase oil demand and raise, or at least stabilize, the share of oil in world energy consumption. Low oil prices would discourage large and risky investment in other sources of energy supply such as coal, nuclear and gas, relax the will of governments to impose conservation measures, reduce incentives to adopt such measures, and sustain the expansion of the world economy which is probably the most important determinant of oil demand growth.

These economic arguments may be valid. It does not follow however that they serve best the interests of all oil-exporting countries. Those countries with small and fast declining reserves, or

with constrained production capacity, would probably suffer more from low oil prices in the present than they would benefit from the higher prices that the policy is supposed to yield in the future. Furthermore, producing countries burdened by a heavy foreign debt do not enjoy the breathing space that would enable them to bear further sacrifices in the short term for the sake of future benefits.

A low oil price policy benefits in the short and in the long term countries like Kuwait and Abu Dhabi because of their special circumstances. In the short term, both were able to compensate for the revenue loss caused by low prices through large increases in production. And they could legitimately expect to benefit in the long term from either price improvements or increases in their share of the oil market, given that they both have very large oil reserves. Furthermore, Kuwait and Abu Dhabi enjoyed (or thought they were enjoying) a degree of freedom, being small producers not burdened with the responsibility of leading the oil-exporting camp. In this respect their situation was significantly different from that of Saudi Arabia, which has always felt constrained politically by security and leadership considerations. In short, the argument that low oil prices are beneficial to oil-exporting countries appeared to serve more clearly the interests of its promoters than those of other countries.

There is an interesting and rarely told aspect of the low oil price policy. The origins of the policy are associated in

people's mind with the price war waged by Saudi Arabia in 1986 against most other exporting countries, both within and outside Kuwait. This, however, is not the case. It is now forgotten that when Saudi Arabia explicitly announced that it was launching this war, it clearly stated its immediate objectives which were: (a) to re-establish production discipline within OPEC, and (b) to induce non-OPEC producing countries to share the burden of production losses that had hitherto been carried by OPEC alone. The fundamental objective was to re-cartelize the oil market in order to keep prices at the level then set by OPEC which was \$26 per barrel. The oil price war of 1986 was not launched in order to reduce oil prices permanently, but to use the threat of low prices as an instrument of economic war to help maintain them at the then preferred level of \$26 per barrel. The war was later lost, and OPEC realized that it would be impossible to bring prices from the very low levels of \$8-10 per barrel to which they had fallen back to the pre-war levels of \$26 per barrel. The notion that the new price target should be \$18 per barrel emerged, and serious efforts were made at the beginning of 1987 to achieve this target. They were largely successful during the first half of the year. OPEC appeared to be back on course as an organization with a price policy (not just a vague price target) and the will to implement it.

All that changed in mid-1987 because of political factors relating to the Iran-Iraq war. In the summer of 1987 we had the Mecca incidents and direct acts of aggression from Iran against Kuwait. At the same time the view emerged in the Gulf, promoted by Iraq and supported by authoritative US sources, that Iran was gaining the upper-hand militarily

and could well win the war.

Our belief is that the Arab Gulf countries, together with Iraq, decided secretly at this time to bring the oil price down and to keep it low in order to weaken Iran economically and therefore strategically. The adverse economic impact of such a policy on Iraq would be removed by financial aid from Saudi Arabia and Kuwait. Iran however would be badly hit as it was then unable to obtain either loans or financial help from any quarter. The policy worked. In 1988 the average level of oil prices was below that of 1986. The oil shock suffered by the exporting countries in 1988, although largely unnoticed, was much deeper than during the famous crisis of 1986. It is also likely that the policy helped to weaken the crisis of Iran and that it brought forward the end of the Iraq-Iran war.

The low oil price policy which initially, and for vital security reasons, had Iraq's approval continued to be pursued after the ceasefire, albeit with some mitigation. Iraq did not object, partly because it was not yet feeling completely confident that the ceasefire with Iran would hold and that the Iranian threat had completely been removed, and partly because Iraq was expecting to be able to increase its oil production very soon by 1.0 to 1.5 mb/d and did not want therefore to upset the market by price rises which would create difficulties on the oil demand front. This explains why Iraq did not object strongly to the production policies pursued by Kuwait and the UAE until late in 1989. In the period following the ceasefire until at least the middle of 1989, Iraq's official statements on oil, and comments made by ministers to journalists and in conferences, advocated a reasonable and sensible pricing policy. The line was

that price stability at reasonable levels, say around the target price of \$18 per barrel, was in the interests of oil-producing countries. Iraq identified its interests with those who had large amounts of excess capacity, because it was expecting to find itself very soon in this position.

Iraq's perceptions of its situation and of its interests changed some time in late 1989. It by then had become much more confident about the lack of aggressive intentions on the part of Iran. More importantly, the Iraqi government became more concerned, and deeply frustrated by its inability to increase production beyond 3.0-3.2 mb/d. It tried to obtain loans for investment projects to increase capacity and to attract foreign oil companies able to undertake such projects, but failed on both fronts. Iraq was told unambiguously that the very large foreign debt incurred in the 1980s made the country uncreditworthy and that low oil prices made the financing of upstream projects economically unattractive. Having lost all hope of increasing production very quickly, and being relieved of anxiety about Iran, they found that a low oil price policy was without merit. On the contrary, it was doing them enormous harm at a time of great economic tightness and duress.

In these changed circumstances, the Iraqi government naturally changed its mind and its objectives accordingly. It began to seek high oil prices which could only be easily achieved through production cutbacks by Kuwait and the UAE. It also asked for a remission of the debt from the Gulf as this would improve Iraq's position vis-a-vis non-Arab creditors.

What remains a mystery is the apparent failure of Kuwait and the UAE to

realize at the end of 1989, or in early 1990, that the situation had fundamentally changed. Before these changes they had been able to pursue an oil production policy that weakened prices in international markets because they were protected by an implicit consensus involving Iraq and Saudi Arabia. To think that they could pursue the same policy, not only without their consensus, but in a situation where Iraq had determined that the policy was contrary to its vital interests, and to pursue it despite friendly but emphatic warnings from Saudi Arabia, raises questions which at this stage can only lead to speculation rather than real answers.

## DESTINATION OF IRAQ'S AND KUWAIT'S OIL EXPORTS

### OECD

About 60-65 per cent of the Iraqi and Kuwaiti oil and product exports in 1989 was destined to the OECD countries. Almost half of the total OECD imports from Iraq and Kuwait went to OECD Europe, and accounted for 11 per cent of their consumption.

The distribution of these imports within OECD Europe is uneven. Some countries imported none or only small quantities of Iraqi and Kuwaiti oil and products, while other countries relied heavily on these imports. In addition, dependency of any particular countries can be both direct and indirect. For example, the Netherlands, with its large export refining industry, imported 271 thousand b/d in 1989, much of which is re-exported after refining. The real degree of dependency of the Netherlands on Iraqi and Kuwaiti oil is therefore much much less than suggested by import figures. By contrast the apparent import dependency of West Germany on Iraqi and Kuwaiti crude and products is fairly low, 29 thousand b/d, but real dependency is significantly larger, since it imports considerable amounts of products from the Amsterdam-Rotterdam-Antwerp region, some of which are refined from Iraqi and Kuwaiti oil. Italy was also a large importer from Iraq and Kuwait. In 1989, it imported 204 thousand b/d, of which a substantial share was oil products from Kuwait. France imported 134 thousand b/d, mainly crude oil from Iraq.

Spain and Turkey are certain to be severely affected for both countries had government-to-government contracts with Iraq. Spain's contract was to import 100 thousand b/d, while Turkey imported 140 thousand b/d under such a contract. In 1989, Spain imported 123 thousand b/d from Iraq and Kuwait, 13.3 per cent of consumption. However, Turkey is the most severely affected OECD country. It is very dependent on imports from Iraq, but has imported little from Kuwait. In 1989, Turkey imported 244 thousand b/d, 58.7 per cent of consumption, while it exported only 49 thousand b/d of refined products.

In terms of share of consumption, Japan appears to be more affected by the boycott than the European OECD countries as a group. It imported about 650 thousand b/d, representing 14 per cent of consumption. But Japan is very well cushioned both by high inventories and its ability to afford high oil prices.

Table 1: Imports: Crude and Oil Products 1989 (thousand b/d)

	Iraq	Kuwait/N-Z	Total	% of consumption
OECD	1,482	1,032	2,514	7.5
of which:				
OECD EUROPE	820	429	1,249	11.0
USA	434	163	597	3.9
JAPAN	215	431	646	14.2

Source: Oil and Gas Information 1987-1989, IEA/OECD, Paris 1989.

The United States imported relatively small volumes of oil and products from Iraq and Kuwait in terms of share of consumption.

### Developing Countries

The share of the developing countries as a whole in the total exports of Kuwait and Iraq is small compared to that of the OECD. But this is not a very meaningful fact. The real problems are that the import dependency of some individual developing countries on Iraq and Kuwait is substantial and that the economic impact of a dislocation in the pattern of oil flows tends to be more severe, other things being equal, on a developing than on an industrialized country.

Brazil and India are both large oil importers with a particularly large dependency on Iraq and Kuwait (imports from these sources were accounting for some 26-28 per cent of oil consumption). Pakistan is a smaller oil-importing country but its dependency on Kuwaiti and Iraqi imports was very high at 47 per cent of consumption.

Table 2: Imports-3Q 1990 (thousand b/d)		
	Kuwait/Iraq	% of consumption
BRAZIL	300	26
INDIA	300	28
KOREA	100	12.1
PAKISTAN	100	47.4
OTHER	600	4.1
TOTAL	1,400	8.2

### USSR and Eastern Europe

The USSR and the East European countries' oil imports from OPEC have increased in recent years. In 1989, Eastern Europe imported 750 thousand b/d, of which 200 thousand b/d came from Iraq. Other major suppliers of Eastern Europe were Libya, Algeria and Iran. After the recent political turnaround in Eastern Europe and the ongoing difficulties of the Soviet Union in maintaining supplies to its allies, the East European countries increased their direct purchase from the spot market. In Poland, economic difficulties in the country this year have reduced the imports from Iraq to about 15 thousand b/d from a former level of 60 thousand b/d. By contrast, Bulgaria, as reported by Petroleum Argus, seems to have switched entirely from Soviet to Iraqi imports (Bulgarian imports range between 100 thousand b/d and 115 thousand b/d). Hungary recently concluded a deal with Iraq to import 1.5 million barrels of crude, which would offset part of a \$30 million Iraqi debt (PIW, 26 February 1990). In 1988, the Soviet Union imported 245 thousand b/d from Iraq.

# **THE FIRST OIL WAR**

*Appendix*

## THE IEA OIL SHARING AGREEMENTS

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The IEA emergency sharing mechanism was created by a majority of OECD governments in 1974 to prevent a recurrence of the situation in 1973-74 when the international oil companies had to operate their own systems for allocating supplies during the embargo and production cutbacks instituted by Arab states in the aftermath of the 1973 war.

The IEA system is in principle simple. Each country has a demand restraint mechanism in place for reducing its consumption by 7 per cent in case of an emergency in which supplies for the IEA group as a whole are reduced by 7 per cent or more, by 10 percent in cases where supplies are reduced by 12 per cent or more. Any supply shortfall in excess of 7 per cent in the one case, in excess of 10 per cent in the other, is filled by a draw-down of stock.

In practice, of course, the distribution of available supplies to IEA as a group is unlikely to be in balance as between member countries. A calculation, therefore, is made for each country to establish what is its allocation "right" from the group or allocation "obligation" to the group. The rights and obligations are then redistributed, in the first instance by voluntary re-arrangements of supplies (e.g. by exchanges between companies), in the final reckoning by measures decided by IEA (which may include directives from governments to companies).

There are, of course, many definitions and rules which complicate what is in essence a simple system. The "trigger" that activates the sharing system is an assessment by the IEA that supplies to the IEA group as a whole have fallen, or can reasonably be expected to fall, below "normal" supplies by 7 per cent or more. "Normal" is calculated by reference to the actual historic "base period" of consumption in the year beginning 5 full quarters prior to the quarter in which the disruption occurs. In the current situation, therefore, the "base period" would be the four quarters 1989/2 - 1990/1.

Apart from the general trigger, as described above, a "selective trigger" may activate the system. This occurs when one individual IEA member country can demonstrate that it has lost, or may reasonably expect to lose, supplies in excess of 7 per cent and that it has restrained its demand by 7 per cent.

While the sharing mechanism is an agreed and, in theory, automatic response by IEA to a supply disruption there is also a defined process of consultation, which may last up to twenty-one days, and must take place before the system is activated. The IEA has an additional consultative process which was introduced in 1984 after the 1979-80 crisis when, although oil supply was at risk and prices rapidly increased, there was no supply disruption according to IEA definitions. It was under this latter consultative process, presumably, that the IEA governing board met after the current crisis broke.



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