

SHORT TERM AND LONG TERM PROSPECTS

FOR THE ENERGY MARKET

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Chairman, Board of Administration

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Text of the

SHELL LECTURE

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It gives me great pleasure to come here to Guildford for the second time at the request of my friend Professor Colin Robinson. Four years ago, at this extremely active university which is gaining renown year by year, I participated in a very interesting meeting devoted to the energy policy of the United States. Today, I have been asked to speak to you about the short-term and long-term prospects for the energy market.

For many long years, the world energy market will continue to depend on the oil market. The present situation of the latter is a new one. The energy crisis has become a crisis of demand. For nearly ten years we had forgotten what overproduction and competition between producers were. For some, this change appears permanent. There will henceforth be no problem with energy supplies or prices. Oil prices will never again climb back up to the present official level, even if there should be a sharp upswing of economic growth. A price collapse may be anticipated, or even hoped for.

Such reasoning ignores a certain number of facts which we shall review.

* Talk given on 20 January 1983 at Guildford, U.K., at the University of Surrey, by Pierre Desprairies, Chairman of the Board of Administration of the Institut Français du Pétrole.

I.

Disappointing Analysis of Figures

We do not clearly understand what happened between 1972 and 1982, before, during and after two oil price jumps. Why did these jumps occur? What real influence are they having on the economic growth rate? What lasting or merely ephemeral transformations have they made in the world energy production and consumption machinery? The truth cannot be ascertained from the statistics we have.

Let us take an example. The current decrease in the demand for oil is the cause of the glut. Is it lasting or temporary?

Between 1978 and 1981, the primary-energy consumption of the OECD countries decreased by 5 percent (2.5 Mbb1/day), while oil consumption declined by more than twice that, namely 13 percent (5.7 Mbb1/day). The decrease concentrated on the demand for oil to be supplied by the OPEC countries. It is now 40 percent lower, namely 12 Mbb1/day, than it was in 1978. This drop is what is at the origin of the competitive price undercutting which OPEC countries are practicing to ensure their vital financial needs. We too often forget that most of these countries are overpopulated and poor and that their mean per-capita income is about one tenth of our own.

In the 12 Mbb1/day drop in sales by OPEC, what share is what may be called structural, i.e. linked to lasting changes, and what share is situational?

The group of six OPEC economic experts, in a report which made a splash in December 1982, breaks down the total as follows: 29 percent stemming from the decrease in the world demand for primary energy, 25 percent stemming from the development of non-oil energy sources (coal, gas and nuclear electricity), 17 percent from the increase in non-OPEC oil (North Sea, Mexico, Alaska), and 29 percent coming from the decrease in oil stockpiles because of both the downward trend of oil prices and the considerable increase in interest rates.

We think we understand this clearly. The first and last of the above figures, i.e. the demand for primary energy and the variation in stockpiles, reflect situational decreases and, in all, represent slightly less than 60 percent of the total. The two middle figures, i.e. conversion to non-oil energy sources and the development of non-OPEC oil, reflect structural changes and account for about 40 percent.

In reality, things are not nearly so simple. Of the 29 percent drop in world energy consumption (3.5 Mbbl/day): (a) What is that share that should be attributed to the decrease in economic growth, i.e. the situational aspect? (b) What is the share of energy conservation? And (c) In this latter case, what is the permanent share resulting from a change in habits (heating, for example) or a change in equipment (more efficient heaters, less thirsty cars, better insulated housing, etc.), and what is the share resulting from the price rise, a share which will disappear if the price keeps stable?

The development of non-oil energy sources (25 percent, i.e. 3 Mbbl/day): approximately three-quarters corresponds to the expansion of coal and one-fourth to that of nuclear electricity. The change for the benefit of nuclear electricity must be considered as permanent, except if nuclear power plants were to suffer any malfunctions. In that case, heavy fuel oil or coal would take its place. As for the increase in coal consumption, it is mainly due to the impact of cement plants, electric power plants and a few industrial furnaces reconverted back to coal. But all these plants have prudently preserved their fuel-oil tanks. They are dual-energy plants. If the price of oil decreases, they will switch from coal or natural gas to heavy fuel oil. A Japanese poll recently showed that, if the cost of oil per barrel should drop from \$34 to \$25, resulting in a price of heavy fuel oil of about \$20, this would be the threshold at which industrialists would abandon coal for fuel oil.

The 17 percent of non-OPEC oil (2 Mbbl/day) seems to be permanent. Oil companies earn \$5 to \$10 per barrel on this oil which they produce themselves, and \$1 to \$3 more for their output from OPEC countries, or even nothing at all if the oil is simply purchased from these countries.

As for the 29 percent linked to the decrease in stockpiles (3.5 Mbbl/day), in principle it is situational. Stockpiles should be built back up if prices should tend to rise and interest rates decrease. But are stockpiles at their normal level at present, at their minimum or their maximum? Nobody can say with certainty. Whereas we know all about storage capacities and so-called primary stockpiles, in refineries or large tank farms, we know very little about "secondary" stockpiles in wholesale and retail trade, and even less about "tertiary" stockpiles in businesses and the general public. There is a controversy to determine whether secondary and tertiary storage capacities represent one-third or half of the total, and to what level they are filled. Likewise, the share of stockpiles which can effectively be mobilized in case of emergency represents only 40 to 70 percent of the total, depending on the expert consulted.

Under such conditions, it is easy to understand why forecasters have varying opinions on the structural and situational shares in the decrease in the world oil demand. A survey made by the European Commission in Brussels in July 1982 concerning primary energy consumption in the Common Market, concerning the period from 1973 to 1981, found that the total for the situational causes of the decrease accounted for 65 percent (50 percent for the drop in economic activity and 15 percent for the price rise) and the structural causes accounted for 35 percent (20 percent due to deindustrialization, i.e. advancing to a post-industrial economy, and 25 percent coming from energy conservation of a permanent nature). The Head of the Economic Survey Service of the IEA estimates, in as far as he is concerned, that decrease in both oil consumption and primary-energy consumption can be interpreted as any figure between 33 and 66 percent for temporary and lasting causes of a reduction in the demand. His conclusion, which appears to be true wisdom, is that the figures available are too general and that national surveys or polls should be undertaken covering industrialists and the general public on stockpiles and storage capacities, on the consumption equipment that has been replaced since 1973 or is slated to be replaced, and on dual-energy installations and changes in consumption habits.

If one may be bold enough to express a personal opinion on such a murky subject, I should like to say that the bulk of the decrease in the demand for OPEC oil should be reversible. The permanent causes appear to be a minority aspect, one would tentatively say about one-third of the 12 Mbbbl/day. The decrease in economic growth in 1975 very quickly reduced the capacity to invest in energy-saving schemes and in conversion to other energy sources.

II.

Permanent Data on the Future Energy Market

Although solid figures are lacking, we are beginning to have some clearcut ideas. The changes that began in 1973 have now almost reached maturity. It appears that a certain number of factors will henceforth be involved, to different degrees, in all future changes of the energy market, for a certain number of years -- let us say up to the end of the century.

1. Irreplaceable oil. On the eve of the crisis, oil was beginning to be an energy source on the way out, both because of the small quantities of reserves and because of the huge increase in consumption -- let us remember the first report by the Club of Rome. Oil seemed to have to be rapidly replaced by other energy sources.

Today and for many years to come, oil appears to be the energy make-up which is indispensable for the needs of the world. In the year 2000 there is every chance that it will still be the leader among energy sources consumed in the world, with 30 or 35 percent of the total. In its most specific uses, it does not seem impossible that it will still be widely used 100 years from now. The ultimate reserves of conventional oil that remain to be used could be somewhat more than 250 Gt. Consumption seems to be leveling off at around 3 billion tons per year, as the result of more economical use and the development of non-oil energy sources in the industrialized countries. The inexpensive proven reserves are being depleted, but at the present rate of consumption they are more than replaced each year by reserves of expensive oil. At the present rate of consumption, the existing physical resources of the world should not create any difficulties for three or four generations to come.

Some have put forward the idea that in about 50 years oil could become an obsolete energy source whose value and price would diminish, and that countries with large reserves such as Saudi Arabia and the Emirates in the Gulf would do well to get rid of it without delay. It will be very difficult indeed to find in nature or to manufacture more cheaply such a concentrated energy which is so convenient for doing anything anywhere, with such cheap and unsophisticated transportation and utilization equipment. By what liquid energy will oil be replaced in cars and trucks or for household and agricultural uses in the Third World? It is now hard to imagine anything other than methanol which could someday play such a role if produced massively from cheap natural gas or coal.

The price of oil, the only energy in the world available at the faucet, is thus destined to remain the bellwether price of the energy market as long as oil is the essential factor in world energy supplies.

2. The oil market, which had once been tamed by the international oil companies, has now returned to the wild. We too often forget that it is the very nature of this market to be unstable and capable of enormous fluctuations, because of the difference between the cost price and the selling price. The companies, which controlled more than 80 percent of the international market in 1970, now govern only 40 percent -- mostly their own outlets. The producing countries now control 80 to 90 percent of their production, compared with 2 percent in 1970. But since they have no organic outlets, they sell only 30 to 40 percent of this production themselves, via their national companies. A great deal of importance has been taken by the spot market, a network of several hundred dealers set up throughout the world and connecting sellers and buyers by telex around the clock. The spot market handles the placement of probably 20 to 30 percent of the oil sold in the world -- this figure has never been accurately evaluated. The spot market merely reflects the result of worldwide supply and demand and is the most important indicator for determining official prices.

OPEC should theoretically be the regulator of the market. But it is not permanently capable of this, as shown by the failure of the recent attempts by producers to agree on production quotas.

OPEC as such has no control over trade and prices, except for brief periods when the joint and immediate interest of concerted action is an obvious necessity, to force prices up or to prevent a dramatic drop. Outside of such crucial moments, OPEC is merely a club of managerial decision-makers. Furthermore, we are no longer in 1973. The price of oil has now made up the ground it had lost compared to other energy sources, and further rises would hold back consumption and speed up the development of the other sources. The failure to apply production quotas at the meeting in December 1982 shows that almost all the poor countries which form the majority of OPEC, although hit harder by the crisis, nonetheless refuse to make sacrifices for the sake of the rich countries in the Arabian Peninsula. Likewise, the ruinous war between Iran and Iraq and the needs for financing which it entails in both countries are aggravating the traditional rivalry between Iran and Saudi Arabia, with the latter openly siding with Iraq. The divisions of OPEC between these two large producing countries, between rich and poor, and between moderates

and progressists make highly problematic the restoring of OPEC as a permanent instrument for controlling the market.

Fortunately for all the producing and consuming countries around the world, including the socialist countries, Saudi Arabia and the Emirates of the Gulf, egged on by one or the other, have accepted to play the role of a regulator for the last five or six years. They can base themselves on nearly 40 percent of the world oil reserves, 60 percent of the OPEC reserves and more than 80 percent of OPEC's financial reserves. The financial reserves of Saudi Arabia alone (G\$160) represent more than two years of its revenues from production in 1982, and those of Kuwait more than eight years. Because of the sparseness of their populations, these countries, namely Saudi Arabia, Kuwait, the United Arab Emirates and, to a lesser extent, Qatar, can, without hurting their economies, make production vary by 10 Mbbl/day, which is more than half of the current production of OPEC. Saudi Arabia alone increased its production to 10.5 Mbbl/day early in 1981 to make up for the drops in Iraqi and Iranian production as the result of the war, and now to prevent the collapse of prices it has dropped it to 4.5 Mbbl/day. If this intervention had not occurred, in 1981 it is quite probable that the price of so-called marker crude - Arabian Light - on the spot market would have risen to \$40 or \$50 and that today it would be between \$20 and \$25.

What does the future have in store? Saudi Arabia does not have as much elbow room as might appear. In relation to the Western countries, in particular the United States which ensures its military security, Saudi Arabia plays the part of an outpost confronting the Islamic revolution in Iran as well as the Soviet Union's thrust toward the oil fields in the Middle East. Therefore, Saudi Arabia cannot avoid being opposed, by increasing its production, to sudden price jumps that would disorganize the economy of the West and ruin the poorest oil importing countries. In relation to the poorest OPEC countries, on the other hand, if prices should decrease it could not let them drop to a level that would drive them to bankruptcy or else it would find itself in a dangerously isolated position in the Third World, and so it must support prices by decreasing its exports. This economic and financial giant has the political weaknesses of a low level of population, and a patriarchal and collective governmental system which engenders long delays before any change in political orientation can be made. Saudi Arabia seems to be in the position of a wealthy merchant making his way through the woods, surrounded by thieves, in danger of being abandoned by his traveling companions from the industrialized countries and the Third World, who are likewise occasionally tempted to seize their share of

the loot. Arabia can fight against the danger of isolation only by making use of its production capacity for the benefit of both the former and the latter, depending on the market situation. In case of absolute necessity, it could doubtless, without either ruining itself or creating grave internal disorder, raise its production to 11 Mbbl/day for six months or a year, or else it could decrease it to 4 or even 3 Mbbl/day for the same length of time. Above and below these production limits, which are fortunately very far apart, there is now no other built-in mechanism for controlling the world market. To prevent decreases that would be catastrophic for everybody, OPEC should then assert itself and the Governments and oil companies of the industrialized countries should actively intervene in conjunction with OPEC. This is conceivable today only in cases of extreme jeopardy. Concerning the fight against price increases, stockpiles and IEA may calm down the situation to a certain extent.

It can be hoped that Saudi Arabia will continue, in the interest of the world economy, to play the role of arbitrator of the world market for a long time together with its allies in the Arabian Peninsula. Anybody who has been watching how it has been playing this role in the last few years can only pay homage to its moderation, its skill and its courage. The leading danger threatening this vital position is that of political subversion inspired by the Islamic revolution. The slow evolution of political institutions which seems to be taking shape, the maintaining of strict religious orthodoxy, the more active fight against corruption, the pursual of economic development -- all of which are trends that are already gaining momentum -- should be able to keep Saudi Arabia sheltered from this danger.

3. The third thing to be learned from what has happened in the last few years is that the oil and energy markets closely depend on the economic cycle and do not occupy a position which escapes from the rules of the game. What has been called the oil shock of 1973 may have intimated that the price of oil was an external and primary factor, imposed on the economy by politics, and whose fluctuations could block or enhance economic growth to a greater extent than any other factor. When looked at from a bit farther off, the quadrupling of the 1973/1974 prices appears to be an exceptional and probably unique phenomenon resulting from the long-time blocking of oil prices by companies in the industrialized countries, with the support of their Governments. This abrupt quadrupling was probably what triggered the halt in the growth of an overheated and galloping economy. Yet it also appears that, in any case, such a rate could not have been sustained and that the economy

would inevitably have slowed down for another reason even if this quadrupling had not occurred. It is also clear that the second price rise was triggered, not by an OPEC maneuver, but by the buying panic exhibited at a moment when stockpiles were very low, with the threat of a revolution in Iran. The exact share in the responsibility of these two price rises in the economic crisis still remains to be determined. Except for sudden and violent moves in world prices, such as the quadruple rise in 1973, or such as might be the symmetrical and perhaps impending danger of a sharp drop, it still remains to be proven that variations in prices of a raw material which makes up only 5 percent of the total GNP can by themselves have such a decisive effect on the growth rate of this entire GNP. The key phenomenon seems rather to be the economic cycle which increases or decreases the demand for energy and makes prices vary, much more than the reverse.

If we discount the impact of political or military accidents, the sequential aspect of economic occurrences seems quite clear. When economic growth is high, the demand for energy is high, and oil prices tend to increase. At the same time, however, business and the general public in oil purchasing countries are encouraged by the rise to reduce their oil consumption and they have abundant self-financing resources. They can both increase petroleum exploration, especially outside of the OPEC countries, and make investments so as to decrease oil consumption. Economic growth stimulates the development of both the cannon -- the price of oil -- and the protective armor -- policies to diminish oil dependence. On the other hand, if there is no economic growth, everything grinds to a halt, including both the rise of oil prices and energy policies. Everything keeps moving on the energy scene, or nothing moves at all, depending on the rate of economic growth.

III.

The Short Term and the Long Term

1. The energy market is now more or less in a state of hibernation. The producing countries and consuming countries today are like two armies paralyzed in their trenches by the freeze. The main cause of this seems to be that economic growth, which was from 5 to 6 percent before 1973 and 3 percent before 1979, is now less than 1 percent -- 0.5 percent for the seven main industrial countries. The development of non-oil energy sources, begun after 1974, has slowed down almost everywhere in the world. Exploring for and developing oil fields have also greatly decreased, especially in the United States, with 30 to 40 percent of the onshore and offshore drilling rigs being inactive. Almost all development projects for unconventional oils (tar sands, oil shales), including the Orinoco belt in Venezuela, have been shelved or postponed. The Third World countries are in a particularly difficult situation. Heavy indebtedness -- \$626 billion at the end of 1982 -- has placed several so-called "taking-off" countries in a practical state of stopping payments (Mexico, Brazil, Argentina, South Korea), is holding down oil purchases, is slowing down investment programs, and is diminishing the true standard of living since the population growth of the Third World is continuing at a rate of 3 percent per year.

Is economic recession inevitable? It will not take us long to find out. Today, faced with the gravity of the social and political consequences of zero growth, all Governments and businesses in the world are making great efforts to set national economies in motion once again, while avoiding the danger of inflation. It will not be long before we know whether we are now in 1931 or 1932, merely on the threshold of an unavoidable crisis that will lead to revolutions and wars, or else -- and this is what we can rationally hope -- whether economic growth will start up once again, taking along with it oil consumption, the price rise and the evolution begun in 1974 toward a world economy consuming less energy and less oil. The dependence of the West on OPEC oil supplies will remain high for a certain number of years -- at least ten to fifteen years -- but will then diminish, whereas that of the Third World will tend to increase, although attenuated by the development of its own oil resources.

Will there be other "oil shocks"? Yes, probably, when the demand for oil resumes, if the market is hit by buying fever caused by any political or military event that might lead buyers to fear a shortage or a price rise. The level of stockpiles is the

determinant factor in the gravity of the rise. The lower this level is, the greater the rise will be, and it is extremely difficult to hold back a deep-rooted upward movement of prices by using strategic stockpiles and, to an even greater extent, the commercial stockpiles of the oil companies. How can an enterprise be convinced to get rid of its stockpiles when prices are going to rise? Such shocks, however, should not be so violent in the future. Most of the rises have already taken place. Public opinion is on the lookout concerning the problem of energy, and energy-policy mechanisms are in place throughout the world. An increase in oil prices would be like a mobilization poster. The machinery to reduce energy and oil consumption would again be set in motion. The movement toward decreasing energy intensity, meaning the amounts of energy used to produce \$1900 of GNP, as well as the decrease in oil dependence appear to be irreversible. Since 1973 there has already been an improvement of about 12 to 15 percent in energy intensity in the industrialized countries, and 15 percent more is hoped for in the next 10 or 15 years.

The main danger today is a collapse of prices. Current official prices are obviously too high for the growth rate of the economy. Spot-market prices are 12 to 13 percent lower than these official prices. A moderate price decrease of a comparable magnitude would be highly desirable.

But if this downward price move should cause the producing countries to maintain or increase discounts to preserve their vital revenues, how far could prices drop? It is the same problem as braking a car when going downhill on a wet road. Theoretically, the lowest selling price is that of the lowest cost price increased by a minimum of profit, let us say \$5 to \$6. Actually, the damage that would be caused by a price of about \$20 appears so great that something would happen to prevent such a suicidal trend for the world economy. Production from a great many fields or costly planned production projects would be halted. This would be the case for different fields in the North Sea, such as Alwyn North which has just been decided upon at a planned cost price of between \$15 and 20, and a great many offshore projects now being developed along the west coast of Africa. The United States would probably be forced to close off its borders to preserve production. The oil companies would slow down exploration. The most densely populated OPEC countries with small reserves (Indonesia, Nigeria, Algeria, Venezuela) which are already producing at their ceilings, or Mexico, would be forced into insoluble deficits. The international monetary and banking system would be threatened by a multiplication of the number of insolvencies and the cashing in of U.S. treasury bonds

by the Saudis. A vertical drop in oil prices would be an absolute catastrophe for the world economy, to a degree that is very hard to assess.

If this should happen, then the interests of OPEC and of the industrialized countries for once would be the same. Therefore OPEC and the OECD would probably now do well to reach an agreement guaranteeing a floor price, for example \$25 -- just as what was proposed several years ago for a price of \$7 in a context confrontation which is not the case at present. The situation is begging for a truce. Both parties should commit themselves to work together to limit sales and increase purchases, by filling stockpiles when the price should approach a dangerous limit. We may even wonder whether, in the absence of any such agreement, this would not be the instinctive reaction of sellers and buyers, a bit like neighbors who ignore or detest each other but who must work together putting sandbags around both their houses if their neighborhood were threatened by a flood.

2. In the longer term, the resumption of economic growth should have the effect of starting up energy and oil consumption once again. The calculating that has been done at IFP on the basis of the most reliable data shows that, with a resumption of 3.5 percent growth per year, and assuming that the energy policies now in force in the world are pursued at a reasonable pace, the demand for OPEC oil should remain appreciably lower than the technical production capacity of the member countries until 1990. It should not surpass 23 to 24 Mbbl/day for a capacity of 31 Mbbl/day.

In the present decade, therefore, after the economic upswing, the moderate countries in the Arabian Peninsula should maintain their role as regulators of the market, but against a rise and no longer against a decrease.

The long-term trend of oil prices is pointing toward a rise, although one that may remain within reasonable limits. (a) The political choice of the countries in the Arabian Peninsula, guided by their preoccupation to make their reserves last, to maximize their profits and to keep the support of the poor OPEC countries, will probably result, like the Taif program in 1979, in encouraging a gradual and moderate rise in the real prices. (b) The slowing down of discoveries since 1970, because of the geological scarcity of giant fields, most of which have already been discovered, limits the risk of overproduction. (c) Likewise, the fields that are being discovered today, which are of difficult access and many of which are situated offshore, are small and produce expensive oil. A 10 000 bbl/day field is now considered to be a

fine discovery, and a cost price of \$10 to 20 as being normal, whereas up to now the norm has been a price of \$5 to 10.

We may try to set a possible limit on the future price of oil. If we try to evaluate the amounts of oil that the world market could supply around 1995-2000, to fulfill annual needs of 3 Gt per year it appears that supplies should not have to have recourse to very expensive unconventional oil at \$50 or 60 (in 1982 dollars) per barrel, but that they should, nevertheless, make fairly extensive use of what we call "expensive conventional" oil. Such oil will come from small fields situated offshore at medium depths, and from the use of more costly enhanced recovery costing \$20 to 25 (1982 dollars). If we add to this cost a constant income for Governments of \$20 to 25 per barrel, we arrive at a market price of about \$40 to 50 (1982 dollars) at around 1995/2000. For the price to rise above this level, the moderate countries in the Gulf would have to be in a position where they no longer control the market. The two main reasons that can be imagined today would be that the Islamic revolution had reached Saudia Arabia and the Arabian Peninsula or that energy policies had been abandoned in the industrialized countries. These two circumstances would be accompanied by a sharp rise.

Another factor could have an influence in the sense of moderating rises. That is the resumption of some petroleum exploration in the oil-importing countries in the Third World which, to date, has been hindered by fears of nationalization, of the non-execution of contracts, and of political instability as well as by a low rate of remuneration in case of discovery. The Symposium organized in Geneva in December 1982 by EDC, an international enterprise for petroleum investments in the Third World countries, brought out the possibility of finding grounds for agreement on remuneration of exploration risks between the oil companies and most of the developing countries present at this meeting. The presence of the World Bank among the financing agencies can, moreover, help calm down the fears of investors.

3. Within the framework of this talk it is not possible to go into detail about the outlook for developing non-oil energy sources. Let us say only that the future of all such energy sources depends mainly on the economic growth rate and on the price of oil, which we consider to be linked to one another.

IV.

Conclusion

These are some of the most noteworthy trends of the future energy market that can be sketched out at the beginning of this year. It is not at all easy to try to forecast how all these changes might occur in time.

If the logic of events is geared to reasoning such as we have just suggested, the moment when the energy market revives will depend on the start-up of the economic machinery as a whole. Because there is apparently no Hitler around today to set off a world war, and rather there is an almost universal determination to set the economic machinery in motion again -- even though everybody is not in agreement to turn the crank in the same direction -- we can hope that the machinery will end up by getting going. When? This is the major unknown. No reasoning can as yet set a date. A relatively optimistic reaction would be to say that by 1985 it might not be impossible to have returned to a growth rate of 3 to 3.5 percent, but this is really only a shot in the dark. If we take this date as a hypothesis, and if there is no spread of the Islamic revolution to the Arabian Peninsula, it will nonetheless take some time for the trend to come back, in a lasting way, to the oil market, from decrease to increase, for the countries most lacking in financial resources to attain full production. This turnaround could take three or four years, or even more, on an uncontrolled market. But the countries in the Arabian Peninsula could and will probably shorten the transition period.

The offensive of energy policies can hardly begin to produce significant results before five years and its full effect to be felt before ten to fifteen years from now. During this period the demand for oil should continue to be strong. Thus it is hardly before the last years of the century that the new equilibrium of the world energy market will be attained, with the Middle East ceasing to provide an excessive share of such world supplies.

As has been suggested several times in this talk, an enormous mass of information still has to be gathered, and a great many surveys and studies must be undertaken to understand the energy market. An effort must be made to understand how different categories of energy consumers and producers in the world will react to a modified economic growth rate, or to a rise or a decrease in oil prices; or quite simply, as we have seen, to estimate what is structural and situational in the spectacular drop in oil consumption that is going on

under our very eyes. The concept of elasticity of energy consumption as the result of a price rise remains a profound mystery as the years go by. Evaluations vary from -0.1 to -0.4 . Likewise, the limits and time required for decreasing energy intensity in the years to come are extremely vague.

Let us be glad about the number and depth of these mysteries. They are fascinating subjects of study for energy economists. They will be our daily bread, and I am sure that my friend Professor Colin Robinson and his disciples at Guildford, as well as their friends in Rueil-Malmaison, will not neglect to make ample provisions in their food baskets.

