

THE NEW ENERGY ERA

by R.J. Kruizenga, Sydney

(Mr. Kruizenga, who is Chairman and Managing Director of Esso Australia Limited, delivered this address at a luncheon meeting of the Institute in Sydney on May 3, 1974. An address by Mr. V.G. Carter of the Shell Group, delivered to a meeting of the Institute in Brisbane, was published in our April issue but the importance and topicality of the subject fully warrants the attention it is currently receiving.)

The energy crisis, the topic you have asked me to discuss today, is one of those phrases which has been adopted by the media to describe a subject of world-wide concern. However, over time a simple label such as this gains more and more new connotations and after a while it becomes clear the phrase no longer has a very clear meaning. I think this is the case with the energy crisis. I believe the time has come to drop this over-worked label and instead of talking about a crisis, I want to discuss how the world has moved, somewhat abruptly, into a new energy era. From a period of cheap and abundant energy, we suddenly find ourselves in one which may or may not involve physical shortages of energy but almost certainly will involve much higher energy cost.

How did this come about and what does it mean for Australia? The answers to these questions are of interest to all, but they are of particular concern to the Securities industry because of the impact they are likely to have on securities markets.

Energy became front page news when widespread shortages occurred in the world supply of petroleum. The indicators had pointed to the possibility of such occurrences for some time, but it was not until the real shortages actually occurred that governments and the public became seriously concerned with the situation.

The shortages were the result of a combination of long term trends and short term events. Now that we are past the period when the threat of physical shortages was the immediate concern, it is possible to see the more permanent implications of the new energy era, and these are that the world's energy is going to cost more today, tomorrow and for the foreseeable future.

Let's take a look at some of the trends and events that have put us into this situation.

A fundamental underlying trend is demand growth -- the world demand for energy in all forms has been steadily growing at a substantial rate for a long time. Industrialization, the products of technological advances, low energy costs, and higher living standards have all contributed to increased energy consumption. Coupled with population increases, the cumulative impact on energy requirements has been tremendous. At present the world is consuming energy in an amount equivalent to the energy contained in 125 million barrels of crude oil every day. It is hard to describe such an amount in a way that can be readily visualized. If you would imagine that Sydney's well-known Australia Square building was a tank full of oil and you tried to supply all the world's energy needs from it, the tank would run dry in about seven minutes; you'd need 200 such tanks to get through one day. (Incidentally, the same tank would serve Australia's overall needs for about one day.)

It is not only the magnitude but the rate of growth of this demand that has contributed to the energy crisis. During the 1960s this growth rate averaged over five percent a year -- which may not seem large until you note that this rate will double demand every 14 years. In the early 1970s, the rate accelerated as major economies were booming.

Where has all this energy been coming from, and what has changed to account for the recent problems?

The main sources of the world's commercial energy are oil, coal and natural gas; combined they account for over 90 percent of total supplies. Oil has superseded coal as the major source and now provides nearly half of the world's total energy needs. While the known reserves of coal are greater, oil is by far the more flexible fuel and is capable of highly diversified applications.

Until quite recently, there has been a surplus of known, developed, and readily producible petroleum reserves. Major petroleum producing areas of the world were competing with one another and with other forms of energy for available markets. The impact of the vast Middle East oil reserves kept world petroleum prices quite low -- in fact prices were on the decline from the 1950s to 1970. As a result, the world grew accustomed to ample supplies of cheap energy.

One consequence of this environment was that the development of other energy sources suffered due to their unfavourable economics relative to cheap oil. Another consequence was that, due to its ready availability, petroleum was able to absorb unanticipated variations in world energy demand. Thus, the world came to rely increasingly on petroleum.

The crucial development in recent years was a steady reduction in petroleum spare capacity. A high level of exploration activity was maintained and there continued to be significant oil discoveries, but these did not keep pace with the growth in oil demand. The result was that by 1972 there was essentially no spare oil producing capacity outside of the Middle East.

By the time of the Middle East War in 1973, most of the oil-consuming world was dependent for all growth supplies on the huge reserves of the Middle East, and this position of strength was already being strongly exploited by these producing countries on the price front.

The 1973 war triggered what most people regard as the energy crisis. Prices soared and for the first time supplies were used in a significant way as a political weapon. Oil embargoes imposed by the Middle East countries precipitated the actual shortages that hit the headlines. As you can see, however, the embargo actions were only the last straw in what was already a precarious balance.

I would like to make a few observations about the future outlook for the oil balance.

First, the Free World's oil dependency on Middle East reserves will continue into the foreseeable future. While other significant discoveries have been, and will continue to be made in other areas, the realities of geology and the time required for the development of alternatives do not give much hope of changing the basic position of importance of the Middle East oil supply capability for many, many years.

Secondly, the oil reserves of the Middle East, over half of those known in the entire world, are physically able to provide a reasonable growth cushion for many years, although it is by no means certain that the producing countries' governments will permit them to be produced at rates which suit consumers' desires. An illustration of the magnitude of these reserves can be seen by looking at recently published data for Aramco, the major producing company in Saudi Arabia. Their current

estimate of probable reserves is 164.5 billion barrels. This is about 100 times the corresponding reserve figure for all of Australia. Aramco's estimates have generally been considered to be quite conservative.

Thirdly, even assuming a significant slowing in demand growth rate, and optimistic new oil discoveries elsewhere, it is clear that there are long term volumetric limits to society's ability to rely as heavily as it has in the past on conventionally produced oil. Conservation in the use of petroleum is going to be as important as the development of new supplies.

So far I've talked about the world's energy and oil developments in terms of volumes. But what about prices? The rise in oil prices came as a concerted action on the part of the major oil exporting nations. Banding together several years ago in the Organization of Petroleum Exporting Countries -- commonly referred to as OPEC -- these nations, largely dominated by the Middle East countries, recognized the increasing position of power they held due to the oil supply/demand situation.

In the period between 1970 and early 1974 the OPEC countries have almost completely altered the historical arrangements that had previously controlled the production, pricing, and ownership of crude oil from their countries. Price negotiations quickly became essentially unilateral decrees. During this period key Arabian Light crude oil increased in price from 1.35 U.S. dollars per barrel to over seven times this figure -- 9.50 U.S. dollars per barrel. You are aware, of course, of widely publicized spot prices far in excess of these levels.

I do not believe there has ever been so dramatic a shift in

economic power in the world as has occurred in the past few months. At the new higher prices there have been estimates that the oil producing nations stand to accumulate monetary reserves of perhaps 75 billion U.S. dollars by year-end 1974 -- this is more than the current foreign exchange reserves of the main industrial nations.

Can the oil producing nations continue to stand together and make these high prices stick? Some of the Arab leaders seem to recognize that it is not in their interest to cause excessive damage to other economies. They also see limits to the amount of money they can spend on their own countries' development or which they can reasonably invest abroad. Also, they may recognize that the more costly or unavailable they make their oil, the more they tend to hasten the economic development of alternatives that would ultimately diminish the strength of their position.

It is possible that at this new elevated price level of the petroleum market, a common OPEC front could deteriorate under internal pressures, and some degree of competitiveness could re-emerge.

Most observers are predicting that the worst may be over in terms of drastic price rises, and that future production levels from the Middle East countries will become geared to more stable individual national objectives. Some even suggest there may be some price reductions, as producing countries vie for extra production. But no one sees a return to the days of cheap oil, and the expectation is that the OPEC countries will continue to cooperate to achieve their essential objectives. Indeed, when one considers the cost of finding new energy reserves or developing alternative energy sources, it is clear that there

are no easy alternatives that would support a case for drastically lower world oil prices. The Middle East governments are fully aware of the practical economies of competitive alternatives. That is the situation the world is facing and the process of adopting appropriate strategies has begun in the consuming countries. The immediate urgent priorities have been on actions aimed at normalising political relationships within the Middle East. The most noteworthy efforts in this regard have been those of Secretary of State Henry Kissinger. The other urgent matter has been the effort to devise an arrangement by which the world monetary system can accommodate the tremendous dislocation in monetary flows which is beginning to occur. The international financial institutions are urgently working on this topic. International cooperation is essential if a series of unilateral approaches -- such as those taken by Italy two days ago -- is to be avoided.

Beyond these matters of immediate urgency, the various consuming countries, with varying degrees of cooperation, are also determining their longer term energy policy strategies for adapting to the new energy era. All countries are looking at ways to conserve petroleum, and in those countries which have the potential for resource development this is taking the course of an accelerated development of energy supplies. This action is designed to reduce their exposure to the possibility of future political interruptions of oil supplies as well as recognition of the fact that at the current higher prices new developments can be justified economically.

You may be interested in some specific things which have been projected for the U.S. if it is to move toward more energy independence even after allowing for a significant moderation in energy consumption. These include —

- The drilling of more than half a million oil and gas wells between now and 1990 compared with the 650,000 productive wells in existence today.
- The construction of more than 60 new oil refineries.
- The construction of an equal number of plants for oil shale and for coal gasification and liquefaction.
- The construction of more than 30 new nuclear plants a year during the mid-1980s, or a new plant every two weeks.
- The development of more than 140 new coal mines including both deep mines as well as surface mines.

The manpower requirements and expenditures necessary to accomplish objectives of this magnitude are truly mind-boggling. The famous Project Apollo, whose ultimate objective was to land a man on the moon, cost about 25 billion U.S. dollars and took a decade. According to a study by the National Petroleum Council in the U.S., a full-scale program to produce maximum domestic energy there would cost some 34 billion U.S. dollars annually over the next 15 years. This is equivalent to one and a half Apollo projects each year for 15 years. An incredulous colleague has pointed out this would be comparable to completing a Sydney Opera House every two days!

Two weeks ago before the U.N. General Assembly, Secretary of State Kissinger stated that the U.S. Government is allocating 12 billion U.S. dollars for energy research and development over the next five years and that U.S. private industry would

be spending more than 200 billion U.S. dollars to increase energy supplies.

I don't know whether all of these programs will ultimately develop, but clearly a massive effort is under way in the U.S.

Of course, such efforts are not confined to the U.S. In a similar fashion Canada is considering accelerating the exploration and development of its vast Arctic regions for oil and gas, accelerated the development of its tar sands and its large reserves of viscous heavy oil which heretofore have not been commercially exploitable. Huge expenditures on pipelines to transport these fuels thousands of miles to markets are also contemplated. In Europe the development of the North Sea takes on new urgency and significance, and in the USSR there appears every prospect of accelerating the costly development of the resources in the remote areas of inner Siberia.

It is against this background that Australia, which is and is likely to remain a significant oil importer, must plan its own long term strategies.

As you are all well aware, Australia has large reserves of coal, apparently ample reserves of natural gas, and is excellently placed in long term potential for nuclear power development. Its principal problem is the future supply of oil where today local production only meets about 65 percent of total petroleum demand.

I would now like to explore briefly with you some of the methods that are available to bridge the increasing gap which has been projected between Australia's demand for oil and known sources of local production.

Certainly in the longer term many new sources of energy such as

solar power can be considered, but I would like to stick to the years through 1985 when Australia's shortfall can be met through importing petroleum, or alternatively through converting energy sources other than petroleum into petroleum products, or hopefully from success in further oil exploration within Australia.

The first solution, that of importing the necessary crude oil and/or products, is probably the least attractive to Australia both from a security and an economic point of view. To bridge the gap in 1980 would require imports on the order of approximately 510 thousand barrels per day, or 60 percent of total requirements. This would mean an import bill to the Australian economy of something in excess of 1.3 billion dollars in 1980 at today's import prices. Without new discoveries imports would escalate rapidly after that and would be well over 2 billion dollars by 1985. It does not take complex calculations or a fancy economic model to conclude that such a drain on Australia's balance of payments would be a serious problem. This import alternative must be considered as a starting point in determining the optimum strategy for Australia to follow in meeting the petroleum portion of its energy requirements.

The second alternative available to Australia is to supplement domestic crude production with synthetic petroleum products manufactured from coal, thus tapping Australia's large reserves. Coal liquefaction is technically feasible, and major efforts are underway in the U.S. and Europe to develop this technology. Coal liquefaction projects will, I believe, be developed for the U.S. and other markets toward the end of the 1970s. It is also feasible to contemplate introducing them into Australia.

There are drawbacks, however. First of all, the conversion

processes themselves are large consumers of energy, and therefore from an energy efficiency standpoint they are not ideal. Second, studies indicate that a vast amount of capital investment will be required. A rough estimate that the capital requirements to bridge the gap I mentioned in 1980 oil supplies by relying on coal liquefaction would be in the order of five billion dollars of investment. Thus the high cost would be a major disadvantage. The advantages of this alternative are that it eliminates the drain on Australia's balance of payments which would otherwise have been created by oil imports, and it would increase Australia's security of supply.

The third alternative -- pursuing conventional oil exploration in Australia is, of course, uncertain but it may represent the least expensive approach to the Australian economy. It is always hazardous to guess about the prospects for new crude discoveries in Australia. This continent has not been all that intensively explored, and therefore there is certainly the prospect of additional oil discoveries. On the other hand, it must be noted that the experience of the petroleum exploration industry has been disappointing in terms of oil discoveries. To date exploration successes have tended to be gas prone, not oil prone. Moreover, exploration in Australia is moving toward more difficult and costly environments. Last year a dry wildcat well was drilled in 1,272 feet of ocean water, and this may well be indicative of where future Australian exploration will be undertaken. I can assure you that at those water depths oil exploration and development are on the forefront of technology and the costs are several times higher than they are in shallower water and on land.

Last August in testimony before the Senate Select Committee on Foreign Investment and Control, I presented rough estimates of

the magnitude of expenditures which might be required if Australia were to achieve substantially greater self-reliance in oil. The estimates were that it might require in the neighbourhood of 200 to 300 million dollars a year in exploration expenditure or more than double recent spending levels. If there were successful discoveries, expenditures of about the same amount would be to develop them for production. While these are large sums, they would appear to be a considerably less expensive way of bridging the supply gap than the alternatives.

Unless the decision is to rely on imports, the time to decide the course for the future is now. The time lags involved in any new large-scale energy developments are long. Oil exploration itself takes time, and even after a discovery it takes a minimum of four to five years to develop new offshore oil after it is found. Coal liquefaction involves even larger time lags because of the newness of the technology.

When I accepted this date to speak today I did not expect the talk to come in the middle of an election period, and it would be inappropriate for me to comment specifically about Australian energy policy. However, it might be worthwhile to spell out the policy considerations which will face any Australian Government with regard to oil exploration.

First, there must be a way of getting oil exploration rights into the hands of companies who have the resources and the technology to undertake the exploration. Under the Australian system of granting long-term exclusive exploration rights the only means available to many companies was to farm-in, but these have effectively been stopped by Takeover Committee considerations.

Any Government must find a way of opening up new acreage for genuine explorers.

Second, the question of crude price and tax provisions cannot be dodged. These two are undeniably the most important economic factors which will either encourage or discourage exploration and decisions on policies for the future in these areas will be expected.

Third, Australia is going to be faced with having to compete with the rest of the world for the resources with which to conduct any exploration and development. This refers to marine seismic vessels, drilling rigs, construction barges, skilled manpower, the technology, and not least of all, the risk capital. All of these resources are in short supply in the world today, and it cannot be assumed they will automatically be available for work in Australia if decisions are made in the future to undertake exploration here.

Fourth, it is a fact that many of these scarce resources are held by foreign companies. Thus part of the answer to the question of the extent to which exploration is to be stimulated in Australia will depend upon the extent to which foreign interests are involved in the exploration effort in Australia.

Finally, for those of you who may be wondering what all this talk about the petroleum and energy industries has to do with the Securities industry, I hope the message has come through that whatever course is taken here, in the future world of higher cost energy, securities markets will be severely strained in every country of the advanced world to finance the enormous expenditures that would appear to be required.

