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ENERGY

Energy for the Future

by Wolfgang Oehme, Hamburg*

The Eleventh World Energy Conference 1980 was held in Munich from the 8th to the 12th of September. "Looking ahead to 2020" – the title of the energy survey published for this conference – indicates that the long-term trend was in the centre of interest. Oil is a finite resource and has to be substituted in the long run. It is the period in between which causes much concern because during this time we cannot do without oil. It is against this background that we have asked Senator Wolfgang Oehme, chairman of the board of Esso A.G., to present to us his views on this critical period of time.

A main topic of the Eleventh World Energy Conference was the economic and social future of developing countries in the world. This is not anymore a challenge only to the industrialized countries but also to the OPEC countries as the world's main oil suppliers. The diminishing role of oil will have a great impact on efforts to solve worldwide energy problems in the future, but oil as such was not the dominating subject of the conference.

At present most of the developing countries still cover up to three thirds of their energy consumption by liquid fuel which is easier to handle in terms of technology and infrastructure. The balance is made up by noncommercial energies such as firewood, vegetable and animal by-products. The conference demonstrated that the petroleum demand of these countries will increase drastically due to the rapid population growth – from 3 billion today to more than 6 billion by the end of this century – leaving less oil available for the industrialized world. This development will also generate a dramatic pressure on the balances of payments of the developing countries, a problem which they cannot solve on their own.

Therefore it seems to be necessary to summarize the basic trends of the "oil world", from where today's problems started.

Increasing Role of Non-oil Energies

Two bottlenecks in petroleum supplies – end 1973/74 and during the first half of 1979 – and a drastic leapfrogging in energy prices have generated a new energy awareness. This is reflected around the world

in a trend towards more economic use of energy and a policy to reduce the dominating petroleum share in the energy balance. But how to guarantee an adequate supply for an ever increasing energy demand to the world if lower but still necessary economic growth has to be achieved?

This objective can only be met by non-oil energies – coal, gas, nuclear and solar energy; during the following decades oil will continue to cover a high share of total energy demand but at a lower rate of growth than in the past. Thus a growing part of energy demand has to be met by sources other than oil.

Everybody knows that coal reserves are larger than oil deposits. This is geologically correct, but due to the worldwide lack of an adequate infrastructure it does not mean that coal is readily available. International coal trade today just covers 8 % of current production compared to 55 % of crude oil production. Worldwide coal trade will have to be increased, but on the other hand coal has to find its technical form of input for substitution of oil and gas. Therefore, it should not be burned under boilers.

No doubt, uranium reserves as breeder input are surpassing fossile energy reserves, but the technology is still not at a level for large-scale operation. Moreover this technology needs wide public acceptance. Self-regenerating energies, e. g., solar energy, will one day substantially contribute to the World Energy Balance. But probably in two decades their share will just be on a par with that of nuclear energy.

On this basis it seems that coal has a fair chance to increase its share from one fifth to about one quarter in the World's Energy Balance excluding the East Bloc

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and China. Nuclear energy – the most sophisticated energy – will be mainly an energy source for the industrialized world and countries with a relatively high level of development. But in industrialized countries this energy is meeting with strong opposition. This will delay the necessary public acceptance, resulting in a slow growth profile. Two decades from now its share might have increased from three to ten %.

To sum up: Coal, nuclear and the regenerating energies will cover probably about 45 % of the year 2000's energy demand. More than 50 % will have to be met by fuels such as oil, natural gas, synthetic energies, i. e. liquefaction and gasification of coal, tar sand, oil shale.

Challenge to the Oil Industry

This summary shows the necessity to increase conventional oil production by about 500 mn tons to 3 bn tons for the Free World in the year 2000. About 40 % of this volume has to come out of deposits which are not even explored today. This represents a phantastic challenge to the oil industry to extend drilling depth and improve production technology. The investments will be enormous. The individual investments per well are soaring in difficult areas like the Arctic or deep sea to the excess of US-\$ 30 mn. Individual production platforms, e. g. in the North Sea, will run above the US-\$ 2 bn dollar brackets. But these efforts still leave the world highly dependent on OPEC oil and the problem of the political availability of this oil will remain with the world.

The output of other sources of energy, like natural gas, will have to be increased during two decades by about 50 % to 1,500 bn cubic meters. Again the industry has to invest in many cases in remote areas far away from consuming centers. Consequently the necessary expenditures will include large amounts for the transportation of liquefied gas as well as for pipelines.

Synthetic energies, the development of tar sands, oil shales, gasification and liquefaction of coal will be a challenging new field. A new raw material basis will be contained in tar sands and oil shales of about 700 bn tons. This represents more than twice the entire conventional oil reserve of today.

The necessary investments to develop these deposits require giant amounts, which limit the competitiveness of these energy sources. Under current conditions about 90 bn tons of oil are recoverable from tar sands and oil shales. 2 bn have been invested in the Canadian tar sand industry

by the petroleum industry to produce 6 mn tons of crude from 90 mn tons of tar sands. The crude extraction from shale in Australia might absorb US-\$ 10 bn to produce 10 mn tons per year in the final stage.

No Ready-made Solutions

The financing of future energy investments will absorb almost inconceivable amounts. Nearly US-\$ 9,700 bn were quoted at the World Energy Conference in Munich. There are no ready-made solutions regarding this matter. Various approaches will have to be discussed in the years to come for a proper formation of risk capital via the international banking system. But still pure financing considerations should not disregard the increasing risk to earnings and capital in this field.

The fact remains that above all energy conservation has to be a "must" for the industrialized world – in any case this will be the most economic approach today and in the future.

To balance environmental protection against the energy needs of the world will be one of the most difficult tasks in the years to come. This will not only be a challenge for the expansion of conventional energy sources like coal and nuclear energy. New energies like tar sands and shale oil will affect the environment but so will the newly developing coal technology for converting the raw material into synthetic fuels. Man will have to overcome these difficulties or synthetic energy sources will not be able to play the role they have to fulfil in the future. Although avoidance of all forms of environmental impacts are highly desirable, the benefits of these restraints should be balanced against the disastrous consequences of energy shortages.

There will be a new field of activities for technically trained manpower. The new energy deposits in remote areas and the new energy processes call for skilled labour. The oil companies will have to contribute heavily due to their vast experience in implementing high risk projects on the basis of their financial resources, their know-how and the highly skilled manpower at their disposal.

In spite of all the difficulties to be overcome there is no doubt that the energy industry can solve the problems of a changing energy pattern for the world. We have to keep in mind, however, that the time is running away fast. Thus, decisions made now and in the next few years will be crucial to securing adequate supplies for the next decades.