



The three-cornered challenge – energy, environment and population

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Mr Lodewijk (Lo) van Wachem was appointed chairman of the Supervisory Board of Royal Dutch Petroleum Company in July 1992, after retiring in June 1992 as president of that Company, a post he had held since 1982, and as a Group managing director, a position held since 1977. He was also chairman of the Committee of Managing Directors from July 1985 to June 1992.

Mr van Wachem was born in Indonesia in 1931 and graduated as a mechanical engineer from the Technological University, Delft, in 1953. He joined N.V. de Bataafsche Petroleum Maatschappij, The Hague, at the end of 1953, and after one year as a trainee moved to Maracaibo as a mechanical engineer. He worked at several locations in Venezuela until 1963, when he moved to Shell-BP Petroleum Development Company of Nigeria as chief engineer.

Mr van Wachem joined Brunei Shell Petroleum Company in 1967 as head of Technical Administration and became technical director in 1969. Two years later, he moved to The Hague as head of the Production Division, SIPM.

In 1972, he returned to Nigeria to become managing director at Shell-BP Nigeria, a position he held until his appointment as Exploration and Production co-ordinator, The Hague in 1976. In the same year, Mr van Wachem was appointed a director of Shell Internationale Petroleum Maatschappij BV. He was a director of Shell International Gas from 1976 to 1979.

He became a director of Shell Oil Company in 1979 and chairman of the Board in 1982, in which year he also became a director of Shell Canada.

Mr. van Wachem was on the Board of Shell Francaise from 1983 and the Board of Deutsche Shell AG from 1984. He recently joined the Board of Directors of IBM and of Credit Suisse Holding and became a member of the Supervisory Board of AKZO NV.

Mr van Wachem is married and has a daughter and two sons. He was made an honorary Commander of the Order of the British Empire in 1977 and an honorary Knight in 1988. In April 1981, he was appointed a Knight in the Order of the Netherlands Lion and in June 1990 he was made a Commander in the Order of Oranje Nassau.

I am honoured to be here this afternoon and to join the small group of people who have been invited to give the Cadman Memorial Lecture and to receive the Cadman Medal.

It can be said of all those who have received this honour before me that they made a significant contribution to the oil industry. To be viewed in the same light by my peers is an accolade indeed, especially since this lecture and award commemorate one of the giants of the oil business. The first Lord Cadman bestrode the worlds of academia, business and politics, at a time of widespread political upheaval and in the burgeoning days of the international oil industry. In the late 1920s, at the peak of his influence, he operated on the same plane as Deterding and Teagle, but also with unparalleled credibility in the eyes of the British government. His was an outstanding career, by any reckoning, and I am proud to be among such as Lord Godber, Sir Eric Drake, Sir Peter Baxendell and Sir Peter Walters, my Cadman Medal Award predecessors, in perpetuating his name.

Today, on such an occasion as this, when one is being honoured for past efforts, and when, like me, one has just 'retired' to some extent from frontline activity, it is tempting to review one's own history a little, at least as far as it coincides with the history of the oil industry.

However, I shall resist the temptation. My preference is to look forward rather than back, to what I would term the three-cornered challenge which faces us today and will continue to face us in the next few decades.

I am talking of the challenge posed by inextricably linked issues – the world's increasing demand for energy, the growth of world population, and the need to safeguard a

viable world for future generations. The growing populations of the developing countries seek to expand their economies to achieve the standards of living we in the developed world already enjoy, which will call for increasing consumption of energy, however advanced the technology deployed. At the same time, there is growing concern, expressed most forcefully in the developed world, about the environmental degradation which has been associated with industrial development in the past and a determination to raise the environmental standards to which industry operates. This is only achievable in the context of expanding economies and, in many cases, will, in itself, call for increased energy consumption. There are not the resources to do everything at once and the challenge to all of us, in all sectors of society, is to establish a sustainable pattern of growth which will meet the legitimate aspirations of all.

I make no apologies if some of my remarks this afternoon may sound familiar. I am not alone in having spoken before on such issues, but I believe strongly that this three-cornered challenge is the most important one facing the world, and it has serious implications for energy businesses. That is why I come back to it today.

Let me start with energy, the subject which links us all with Lord Cadman. It is widely known that in Shell we set much store by scenario planning. Scenarios are not forecasts, but views of different futures, each internally consistent, against which we test the robustness of our business plans. We are currently preparing new scenarios in which the principal factors which affect our industry will be examined: you will not be surprised that the themes of

geopolitics, economics and the environment figure largely.

They will take into account the dramatic events which we have seen on the world stage in the last two or three years – events which suggest that our past estimates for the growth of world energy demand may have been too conservative. Almost simultaneously, we have seen tremendous economic and policy changes in eastern Europe and in Latin America, with significant implications for energy demand. With these changes has come a fundamental shake-up in the political and economic certainties we have accepted for so long. Now there is the possibility of a radically different sort of world, with new hopes and fears. What happens, or does not happen, in the developing world is of the greatest importance. Concerted global efforts to resolve worldwide problems may now be more feasible.

As the developing world strives to meet the needs of its people, to industrialise or develop an industrial base, and to create market economies, the impact on energy demand may be even greater and sustained over a longer period of time than hitherto thought.

Imagine the impact on demand if China and India, which together account for some 40 per cent of the world's population, begin to show the economic growth rates that have transformed the Asian newly industrialised countries. If levels of car ownership in China were to reach those of the United Kingdom today another 430 million cars would have to be manufactured and fuelled – which is about the entire car population of the world today!

Developments on this scale would present a significant challenge to the energy industries to

meet the increase in demand efficiently, safely and cost-effectively. There is no question but that we will need all the world's current sources of commercial energy to meet demand now, and in the near future. In 1991 world primary energy demand was around 168 million barrels per day of oil equivalent; oil and gas made up around 60 per cent of this and coal another quarter. Nuclear energy and hydropower were, of course, significant sources of electricity, but wind, solar and biomass energy remained small.

For the next quarter of a century, we will have to rely on these existing sources of energy. This is simply because of the huge scale of energy facilities and plants and their very long lives and construction lead times. There will be some shifts in the pattern of use driven by environmental concerns – notably an increased dependence on natural gas rather than coal and oil. But essentially the fossil fuels will continue to dominate energy supply for many years yet, and the degree of freedom to choose between them will be limited, particularly over the next decade.

In any event, growth in energy demand, it seems to me, is almost a prerequisite of achieving sustainable development. To quote a recent combined statement by The Royal Society of London and the US National Academy of Sciences: 'Sustainable development implies a future in which life is improved worldwide through economic development, where local environments and the biosphere are protected, and science is mobilised to create new opportunities for human progress'.

For myself, I cannot think of a means of bringing about global economic development that does not involve the increased use of energy.

Energy is required to grow the food that people eat and to provide them with light and cooking facilities. In the first stages of development, populations move from depending on firewood to commercial fuels such as kerosine or liquid petroleum gas. Then, as societies develop, the growth of manufacturing industry and energy consumption go hand in hand.

It is only this increased economic development that provides the resources to protect local and global environments and to fund scientific advances that bring new opportunities for progress. And we must not forget that the pressing environmental problems of very poor people are things we take for granted – clean drinking water and proper sanitation. I think if you ask anybody who has visited Calcutta, for example, if they would support the view that the city was in urgent need of a modern sewerage system, you would find enthusiastic support; but there are some who would show less willingness to accept the energy cost of building and running it.

It may be that no demands to improve the condition of even the poorest communities justify the profligate or unwarranted use of energy. But we have to accept that, if economic growth is a significant ingredient of sustainable development, then so too is energy.

Herein lies the dilemma. We accept that growth is required, both to meet the natural aspirations of the people of developing countries and to provide the impetus that is needed to achieve sustainable development. And we recognise that achieving that growth will require the consumption of greater quantities of energy. Yet the generation of energy, particularly from

the burning of fossil fuels, presents inherent environmental problems.

If the greater use of hydrocarbon fuels in large parts of the world is inevitable, that will, of course, mean increased production of carbon dioxide – an important contributor to the greenhouse effect. Today, burning fossil fuels results in the emission of between five and five and a half gigatonnes per annum of carbon as carbon dioxide, split about equally between OECD (Organisation of Economic Co-operation and Development) and non-OECD countries. If we look ahead to 2020, it is easy to foresee that the non-OECD countries alone could account for that quantity. The OECD countries might expect to hold emissions at about today's level so a 50 per cent increase is quite on the cards.

There is strong support in the political world for the view that man-made emissions are likely to augment the greenhouse effect and lead to some degree of global warming. But there is still debate among authoritative individuals and groups about the basic science and how significant the effect might be in different areas of the world. Neither is there clear consensus about the most appropriate proposals to counter global warming – as is clear from the discussions that took place at the Rio Earth Summit, and in the reaction to the European Community's proposals for a carbon/energy tax.

Nonetheless, practical precautionary measures to ameliorate the position are being taken and should be encouraged, particularly where they also have other beneficial effects. A clear example is improving energy efficiency in the developed world and exporting that technology to developing countries. Another beneficial factor could be a switch to natural gas

– with its lower carbon content – for power generation, but even that cannot be done overnight. Other possible policies include encouraging nuclear power but this has its own set of problems. Some renewable energy technologies look promising, but will take some time to become competitive and even longer to contribute a significant share of world energy demand. As I said earlier, we will need to make the most effective possible use of all these sources of energy in the coming years.

But carbon dioxide is only part of the dilemma we face in meeting the world's growing energy needs. Burning fossil fuels also generates pollutants such as nitrogen oxides and sulphur dioxide, which contribute to urban air pollution and acid rain. These have to be treated separately, and the actions which minimise them are often at the expense of increasing carbon dioxide emissions. The classic example is the move towards low sulphur diesel, where for every tonne of sulphur removed in the refinery an additional 20 tonnes of carbon dioxide is released into the atmosphere.

As with so many areas of conflict, the question is one of balance. There is much that we in the energy industries can do – and are doing – both in cleaning up our own acts and in making our knowledge available to others. But finding the right balance between challenges and solutions is not just a requirement of the energy industries, or even industry generally. Many environmental problems have a global dimension and demand global answers. They are too big to be solved by one sector of industry, one nation, or even one region. All the stakeholders must shoulder the responsibility of ensuring that the future is a fit one for the generations to come.

Industry generally has a responsibility to co-operate with others in society, most notably governments, to seek desired solutions to environmental problems.

But, in the final analysis, decisions must reflect the collective will of people expressed through their governments. The duty of industry in the interests of society at large is to ensure that these decisions are based on a correct understanding of the relevant facts.

I believe one responsibility of governments is to establish level playing fields, not through restrictions that hamper industry's innovation or discourage voluntary commitment, but through a market-based approach to legislation that makes the best use of industry's strengths and enterprise. Governments must debate with industry and others the strategies and options available; when consensus is realised they should set clear guidelines that are not constantly changed. In particular, government intervention in the process of change, either nationally or internationally, should not distort competitive forces. In a market economy, industry's ability to finance programmes to reduce its environmental impact depends on its continuing to make a profit. Companies should take the lead when they can; but, on the other hand they should not be expected to gamble reputation or assets where they may be exposed to unreasonable or unpredictable penalties – I have in mind, for example, the penal risks now associated with marine operations in United States waters.

Regardless of the problems of governments in achieving consensus, I believe we in the energy industries have a prime responsibility to minimise the environmental impact of our activities by continuing to pursue excellence in

our environmental performance. For many years, we have accepted and acted on that responsibility and, despite setbacks and accidents, huge strides have been made.

But whatever progress we make seems to be outpaced by the increasing skills of the analytical chemist. Twenty years ago scientists measured trace contaminants in parts per million: now, with the aid of improved analytical techniques, coupled with advances in computer power, they can track contaminants in parts per billion. The European Commission, for example, requires that the amount of individual pesticides in drinking water is no higher than one-tenth of a microgram per litre. Ten years ago, it was a challenge to measure such a small contamination. These days, a millionth of a microgram, or one picogram, of certain pesticides can be detected in a litre of drinking water. All too often these striking advances in analytical technology are announced as if they represented the discovery of a new hazard to our lives resulting from industrial pollution. We might almost borrow an acronym from the computer world – WYSIWYG – what you see is what you've got!

Remarkable progress has been made in cleaning up some forms of air pollution in many parts of the world. Last year the OECD report, *State of the Environment*, said that concentrations of sulphur dioxide in urban areas had decreased by 30 to 75 per cent in OECD countries over the previous 15 to 20 years.

In our own industry, emissions of lead and sulphur from products have been reduced. Flue gas desulphurisation units installed in coal-fired plants can effectively reduce sulphur dioxide emissions into the atmosphere. Advanced gas scrubbers can remove about 90 per cent of the

sulphur dioxide and can also be designed to reduce emissions of nitrogen oxides at the same time. Technical improvements to boiler and burner designs have made it possible to reduce emissions of nitrogen oxides to meet stringent regulations in Europe and the US.

A number of clean coal technologies are now also available, the most promising of which first gasify the coal, then clean the gas and use it to fire gas turbines. Other more advanced technologies, still at the earliest stages of development, may enable us to use more cleanly the world's vast reserves of coal.

The technical potential for increasing energy efficiency is high. For example, simply replacing incandescent light bulbs with compact fluorescent bulbs reduces electricity consumption, while labour costs are also cut because they last five times as long. Harnessing waste heat from a power station to heat homes cuts central heating bills and increases the efficiency of the power station. The average new car in the United States in 1990 does 28 miles to the gallon, compared with 23 in 1980.

It is exceedingly difficult to estimate how much the application of technical potential can reduce energy demand in practice, but studies in the United States have come up with reductions in energy use of an impressive 20 per cent even at the conservative end of the scale.

Annual evaluation of the energy balances in Shell refineries has shown that efficiency has doubled over the last 30 years, and upgrading of equipment and improved product quality continues to boost environmental performance. In the Chemicals industry, the energy required to manufacture polypropylene fell by 46 per cent over the nine years to 1991.

These and other measures now available to minimise the environmental impact of burning fossil fuels while maintaining industry are the direct result of human ingenuity. As an engineer, I should perhaps be optimistic enough to believe that a technical solution will be found to nearly every environmental problem. I am pleased to see that I am in distinguished company in this view.

Back in June, the 'Heidelberg Appeal' by nearly 300 eminent scientists, including 52 Nobel Prize winners, stated that: 'The greatest evils which stalk our Earth are ignorance and oppression, and not Science, Technology and Industry, whose instruments, when adequately managed, are indispensable tools of a future shaped by Humanity, by itself and for itself, overcoming major problems like over-population, starvation and worldwide diseases.'

The appeal touches on a curious anomaly of our times. Nearly a year ago, during an address at Yale University, I commented briefly on the difference between 18th century and 20th century attitudes to science. The 18th century was fascinated with things scientific, just when the world was beginning to be turned on its heels by technology; yet few ordinary people had really benefited from technological achievement. By contrast, there are many in the 20th century who seem to hold a marked aversion to science and a resistance to the deployment of technology, while benefiting to the full from the advantages that scientific knowledge brings.

Anyone who seeks to live in a world that does not depend on science and technology might do well to heed those eminent signatories to the Heidelberg Appeal who contend that a

'natural state' does not exist and probably has never existed since homo sapiens first appeared on earth and began to use the world's resources to meet his needs.

However, the dilemma remains that while we have made great strides in applying science and technology to finding solutions to environmental problems, the solutions themselves sometimes involve greater use of energy. And if such is the case with some anti-pollution measures, judgements have to be made about where the balance of benefit lies.

While these issues of environmental degradation and global warming are serious threats to our goal of sustainable development, at least as serious an obstacle is population growth. In fact, in terms of the growing energy needs of the developing countries, they are inextricably linked.

In some industrialised countries, birth rates are falling below the level needed to maintain their populations. And even though annual growth rates are falling, the world's population is growing by nearly a quarter of a million each day. Last year, the United Nations Population Fund stated that population growth was then even faster than its 1984 forecast. The UN's current mid-range projection is that population will rise from 5.4 billion in 1991 to 10 billion in 2050. But that depends on fertility rates stabilising at replacement levels. And all but five per cent of those extra people will be residents of the developing or less developed countries, contributing to the growth of their energy requirements.

As business people yourselves, you will appreciate that I find it difficult to comment on population growth rates. It is not for me to

explore the ethical or religious aspects of the issue, particularly on this occasion. That is best left to moralists and churchmen. However, I have lived for much of my life in countries at a stage of rapid population growth, and so I have seen at first-hand some of the difficulties that can arise as a result, both economically and environmentally.

It often seems to me that those who live in developing countries have less opportunity to contribute to the debate than some of the more vociferous elements of the developed world. I vividly recall being asked by the president of one developing country to explain to my fellow Europeans that, for him and for his fellow citizens, the environment did not just consist of plants and animals, but of men, women and children too.

We should all be quite clear in our minds that the men, women and children in the developing world will strive to achieve the living standards of their choice, just as those of us who live in the developed countries have done. And, of course, they have every right to do so. I also believe that what they will seek is something similar to what we have.

They will, at the very least, seek clean water, sanitation, reliable electrical power for light and heat, and consistent fuel supplies for cooking. They will want roads and communications. They will want the opportunities that education brings. They will want jobs. And they will want leisure activities, CDs, microwaves and dishwashers, plus the time and money with which to enjoy them.

Try as I might, I cannot see any way in which these needs and wants can be met without using more commercial energy. And that, of

course, has its implications for the concept of sustainable development.

If we are not to jeopardise the possibility of sustainable development, then the world as a whole must find ways to manage the effects of the extra demands that the growing numbers of people will place on the earth's resources.

How can this be done? Staying with population growth for the moment, the decline in birth rates in Latin America and Asia over the past three decades has shown a good correlation with socio-economic development. Plainly, as wealth increases, there is no longer such a need in some cultures to protect one's future through the security of large families. Economic growth, in turn, is facilitated by education and one can certainly understand how increased education, particularly among women, combined with reductions in infant mortality rates, would contribute to slower population growth.

What is harder to see is how these influences on population can be effected at other than the level of the individual in his or her own country. Resolutions taken at assemblies around the world will probably change the situation very little. What I believe will make a substantial difference is a massive programme of education appropriate to the overall needs of each country.

Of course, there are other measures that can be taken to ease present problems and encourage progression to our goal of sustainable development. I would include among them an acceptance that together and severally we will have to take difficult and sometimes unpopular decisions. I believe that we must view the earth as one entity and accept, for example, that higher production of, say, greenhouse gases in some areas, can be partly offset by lower emissions

elsewhere. This will put pressure on the developed world to use its energy more efficiently and to ensure that its technology helps the rest of the world use energy just as efficiently.

Also high on my sustainable development list would be the need for industry to continue to play its role in wealth generation. I have said before and feel no shame in repeating that only growing economies can provide the resources to meet people's aspirations and need for jobs. Only strong economies can turn sustainable development from a concept in our minds into reality for our children.

The three-cornered challenge is a difficult one. But I don't see the future as gloomy, despite the dark warnings of the doomsayers. I believe that, with commitment from all the stakeholders in the environmental debate, and that surely means every person alive on this earth, with the careful use of resources and the appropriate application of our science and technology, we will learn eventually to balance the needs of the world's population with the needs of the earth. It will not be an easy task, and many of you will be engaged in it far longer than I. But I believe you are more than a match for the task – and I wish you well.

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