



# The environmental challenge and the oil industry's response

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## *THE ENVIRONMENTAL CHALLENGE AND THE OIL INDUSTRY'S RESPONSE*

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Shell companies have their own separate identities. In this paper the collective expressions 'Shell' and 'Group' and 'Royal Dutch/Shell Group of companies' may be used for convenience where reference is made to companies of the Royal Dutch/Shell Group in general. Those expressions are also used where no useful purpose is served by identifying the particular company or companies.

## Introduction

The environmental challenge is formidable. While such a challenge is often called 'sustainable development', I should like to rephrase it:

- Can mankind manage its energy use?
- Can it do so, where a growing global population wants to realise economic development, but at the same time wants to clean up the world?
- Can industry provide economic and green growth?

Society's concerns and expectations about the environment have increased tremendously over the last ten years. We see it in:

- the enthusiastic support of environmental action groups;
- more demanding legislation;
- higher penalties for polluting; and
- some far-reaching international conventions.

While this green revolution has captured the interest of both consumers and governments, it has also affected industry. Industry's attitude to environmental protection has changed in line with society's thinking. In the part of industry that I know best – the oil business – protection of the environment is regarded as an investment for the future. It has increasingly become an integral aspect of every business undertaking and a decisive factor in predicting the commercial success and feasibility of future operations.

And, as with the other elements that contribute to business decision-making, the environmental challenge is surrounded by the usual uncertainties and dilemmas that face businesses daily.

## Environmental performance

There is no simple switch that can turn an industry's environmental performance from 'lean and mean' into one that is 'keen, clean and green', as some green warriors might like to believe.

I do believe, however, that industry is

in a strong position to make significant contributions. The oil industry, for instance, is skilled in the effective management of natural resources and it continues to realise the potential of developing and implementing new technologies that allow fossil fuels to be used in the most efficient way. It should not, of course, neglect the realities of economic boundaries and related technical limitations.

Indeed, in the face of a growing world population and a growing income per capita in the developing countries, it should be acknowledged that the continued generation of economic profits is a basic requirement for the long-term conservation of the environment.

Industry must also acknowledge the need to communicate its activities more widely, and to do much better in conveying the message that it is trying honestly to behave in an environmentally responsible way. This should help to foster an atmosphere in which constructive debate may lead industry more rapidly towards achieving common goals.

These are the themes of this paper, but first, what is the nature of these things that we package together and term 'environmental issues'?

## Environmental issues

A distinction is often made between local, regional and global environmental issues.

### Local/regional

The local and regional issues centre on what can almost be regarded now as 'traditional' problem areas, such as:

- air quality in industrial and metropolitan areas;
- acid rain;
- soil contamination;
- river and coastal pollution; or
- threat to rain forests.

For the oil industry, such issues translate into primary aspects of environmental management for which, generally, technical solutions are, or will be, available.

Indeed, the technical part of the solution is often the easiest. More difficult

usually are the economic, societal and cultural elements. For example, solutions sometimes come at such extremely high cost, that their implementation jeopardises economic viability. Sulphur oxide emissions from refineries illustrate the point. The options available for reducing these emissions range from desulphurising refinery fuels before burning, to using sulphur-free fuels – such as sweet natural gas or applying flue gas desulphurisation techniques.

Some of these options are complementary, some are mutually exclusive, but the incremental costs of all of these can be quite significant. The net cost, for example, of eliminating a tonne of sulphur when replacing high sulphur by low sulphur fuel can be as low as \$200 or \$400, but it might be as high as \$3000 to \$5000 for flue gas desulphurisation.

It is evident that when refitting existing refineries, the point will be reached where the progressive reduction of sulphur emissions must be rejected for economic reasons. Industry must then consider 'minimum regret' solutions.

The answer to this type of environmental problem lies in the construction of new refining installations, in which environmental protection is totally integrated in the refinery process. Modern refineries:

- are designed for maximum added value of upgraded products;
- are equipped with advanced, energy-efficient facilities; and
- use clean technology.

Two examples in one area come to mind. In Rotterdam, Exxon has opted for the flexi-coking route using desulphurised by-product gas. In the same area, Shell has preferred the hydro-conversion route which, in combination with a currently planned residue-gasifier, will drastically cut sulphur emissions (Figure 1). In both cases they represent long-term project developments that break away from traditional end-of-pipe solutions, and are viable economically.

Resolving local and regional environmental problems may, in terms of time-scale, therefore depend on the economic service life of installations.

### Global

Global problems, however, present a more complex challenge in dimension and time.

The possibility of climate change due to human activity is, presently, by far the most important global environmental

Figure 1

The hydro-conversion unit at the Shell Pernis refinery



issue and it may well be our main challenge in the next decade. The issue itself is surrounded by uncertainties. Although there is consensus that increased greenhouse gases may cause a warming effect over time, there is no clear picture of regional climatic responses and an even less clear image of the ecological and societal effects of shifting climate zones (Figure 2).

Moreover, the effects of climate change must be measured over decades, if not centuries, which essentially invalidates the normal criteria used to assess the relative attractiveness of competing options. Despite these uncertainties, options to counteract the enhanced greenhouse effect have been put forward; most favoured among which are energy efficiency and inter-fuel substitution.

## Energy efficiency

Increased energy efficiency, in particular, is a realistic short-term option. It is not clear, however, that the annual aggregate improvement rate of two per cent experienced during the 1970s could be achieved over the next 25 to 30 years. In many sectors of oil consumption – including the automotive, aviation and domestic sectors – the potential for energy efficiency will not be determined by advances in technology alone. More important will be whether or not economic

systems and public policies can be developed that allow new technologies to be implemented more rapidly and transferred to those countries that need them.

Environmental management, to curtail the considerable and often unnecessary losses and emissions of greenhouse gases, is required in some areas, together with an economic process to transfer information and aid in training. With rapid commercialisation and implementation of new technology, annual efficiency increases of between 1% and 1.5% could result.

## Inter-fuel substitution

In terms of inter-fuel substitution, the picture is not as clear as it might at first appear. For example, by unit of energy burning, natural gas does indeed produce less carbon dioxide (CO<sub>2</sub>) than burning oil, which in turn produces less CO<sub>2</sub> than coal (Table 1). But to get a more accurate comparison of alternative fuels, factors other than carbon content must also be considered, such as:

- the fuel economy of the engines that use different fuels;
- the losses that occur during the production, transportation and distribution of the fuels; and
- the CO<sub>2</sub> generated in treating, conversion and refining processes.

Table 1

### Relative production of carbon dioxide per unit of electricity generated\*

Coal	1
Fuel oil	0.7
Natural gas	0.5

\*In conventional plant

This 'well to wheels' view of CO<sub>2</sub> emissions is essential to determine the true environmental merits of the various fuels (Figure 3).

If the comparative costs and CO<sub>2</sub> emissions of these fuels are considered, conclusions may be drawn that were not obvious initially. A recent study of

Figure 2

**Global warming – the chain of uncertainty**

Policy  
Prevention

Level of future GHG emissions

Examples:  
What will be the future level of fossil-fuel combustion?

Timing and concentration of GHG in atmosphere

What is the uptake of CO<sub>2</sub> in the ocean?

Global climate response

How will the earth's albedo change?

Regional climatic changes

How will local temperature and precipitation patterns change?

Policy  
Adaption

Impact on natural and human systems

How fast can natural systems adapt to climatic change?

alternative transportation fuels made by Shell Australia showed, for instance, that diesel fuel can be very attractive both economically and in terms of CO<sub>2</sub> emission. Of the fuels studied, only biomass and nuclear-based alternatives produce less CO<sub>2</sub>, but at significantly higher costs.

Given the size of the problems associated with a possible climate change, it seems prudent to take precautionary measures. It seems certain that fossil fuels will continue to be the world's major energy sources for many decades to come (Figure 4). Consequently, any strategy that is adopted to mitigate possible climate change is bound to have considerable impact on the core business of the oil industry. A strategy to reduce CO<sub>2</sub> might best be served by implementing energy efficiency improvements and adjusting the fossil fuel mix. In addition, more research and development into renewable energy sources should be encouraged.

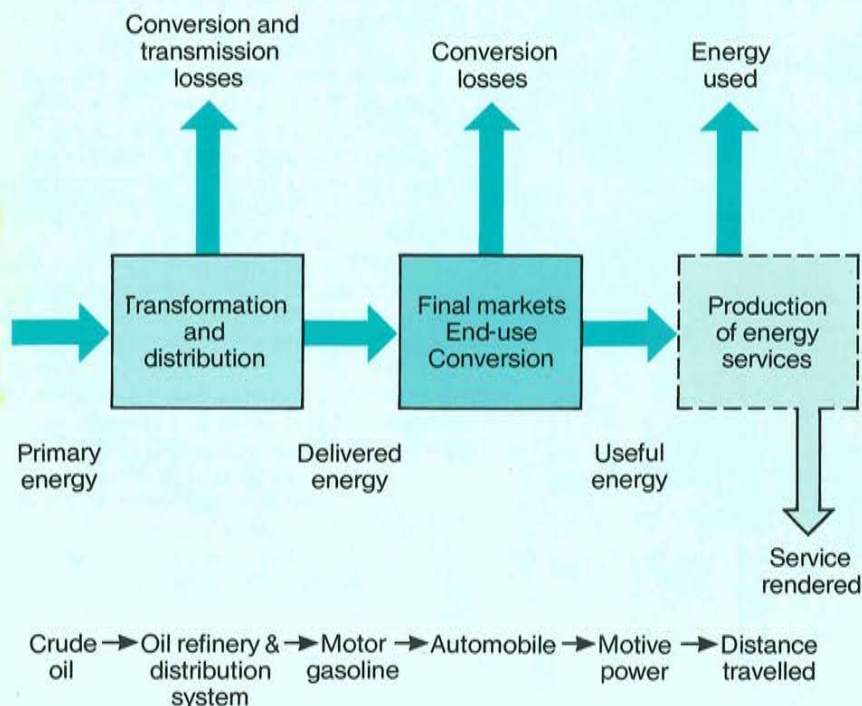
While the greater part of the development of energy efficiency technologies will, strictly speaking, concentrate on end-use, the role of the oil industry is to:

- improve efficiency of supply;
- manage energy efficiency in its own operations;
- encourage more efficient use by others; and
- accommodate shifts in product demand, as well as in type of fossil fuel, where this leads to higher efficiency.

Moreover, the oil industry must continue to play an active role in making these technological advances and management skills available worldwide.

Figure 3

**Energy chains and energy use**



**Shell policy**

If I may now turn to my own organisation, conservation of the environment is an integral part of the strategy of Shell companies and figures among the business principles that guide their activities. It is the firm belief of Shell companies that a pro-active approach to environmental protection is in their long-term interest.

This conviction, together with the immense growth in environmental issues and concerns – raised both publicly and within Shell companies – resulted in a

recent review of the Shell environmental policy.

Following this review, it was decided to take an active step forward by stating that our long-term goal should be to eliminate from Shell companies' operations all emissions, effluents and discharges that have a negative impact on the environment. With this as the ultimate aim, other elements of the policy fell into place, building on existing experience and practice. They include:

- a quantitative inventory of the present emissions, effluents and discharges that could have a negative impact on the environment;
- a strategy of continuous improvement in environmental performance; and
- the development of concrete action plans and targets as part of the individual business plans of Shell companies.

The next step is a further review of products. Guided by Shell companies' experiences in product stewardship, products will increasingly be needed that do minimal damage and these should be recycled where practicable or be disposed of safely.

Implementation of these policies is supported by way of:

- environmental guidelines;
- specialist advice on specific topics;
- management progress reports; and
- through the use of environmental management tools.

Environmental impact assessments, which are analyses conducted at a very early stage of project planning, are among such tools currently in routine use by Shell companies. Another is a standardised health, environment and safety procedure to verify new plant designs. Environmental auditing is a voluntary internal review of the procedures and management systems in place and tests whether or not they are working as they should.

Regardless of the tools used, the success in meeting the environmental challenge depends primarily on the initiative and the decisions made by the managements of individual Shell companies. They have to set the pace, recognising that technical and economic factors cannot be separated from environmental projects.

## Conclusion

Fossil fuels will continue to be needed to satisfy the world's growing demand for energy. But no one can deny that the production, transportation, refining and use of fossil fuels have an impact on the environment. Minimising this impact and, in a broader sense, managing the complex interactions between energy supply, environmental conservation and economic development, represents a challenge to us all.

I believe the oil industry can meet this challenge constructively through its:

- experience and know-how of efficient production techniques;
- contribution to economic growth; and
- potential to develop new, clean technology.

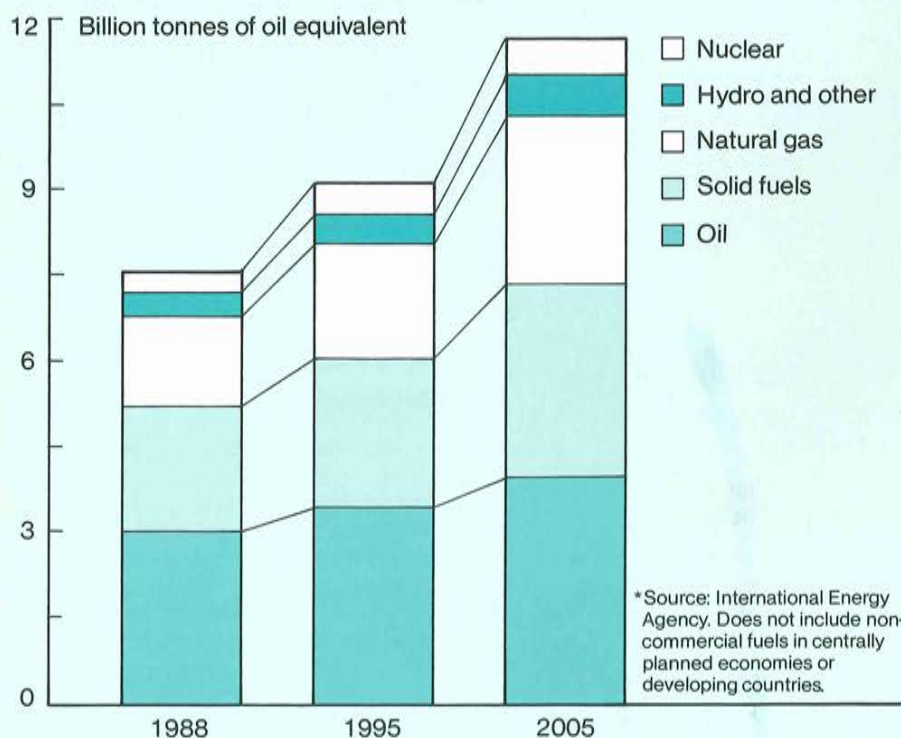
The complexities of the possible global climate change are regarded as very important issues for the years to come. Here, high-quality scientific research is needed to help reduce today's uncertainties. For the oil industry, energy efficiency and adjustment of the fuel mix on a 'well to wheels' basis, represent the most effective and economic means to counteract the growth of greenhouse gas releases. There needs to be more research and development effort into possible renewable energy sources.

The transfer of technology and environmental management skills should be promoted actively and companies need to adopt a more a pro-active environmental policy, that is aimed at continuous environmental improvement.

Finally, it is incumbent on all of us to communicate to those outside the oil industry, exactly what we are doing today – and plan to do tomorrow – to meet the environmental challenge. The onus is on us to explain credibly the stringent measures that are already in place and the increasing effort that is being made to protect the environment from the potentially hazardous effects of operations and products. This must remain a common goal while, at the same time, the industry ensures that it continues to provide consistent and reliable energy sources well into the next century.

Figure 4

### Energy demand forecast\*







## Related publications

*The environmental challenge and the oil industry's response*, considers the balance that must be struck between, on the one hand, a growing population that wants to realise economic development, and on the other, the same population that wants to clean up the world. Related publications include four Selected Papers: *Global warming: the role of energy efficient technologies*, by

Ged Davis; *Plastics: a reusable resource*, by Martin Dennison; *Economic growth and the environment*, by Dennis Anderson; and *Environmental responsibilities - an industry view*, by Ian Graham-Bryce. Two speeches, *The environmental challenge - an industry view*, by H de Ruiter and *Business and*

*the environment: an industry view*, by JM van Engelshoven, together with two publications from the Shell Briefing Service, *Population, environment and energy*, SBS number two, 1989, and *Global climate change*, SBS number four, 1990, may also be of interest. Information on ordering these and other publications can be found on the inside front cover of this paper.

