



ENERGY & CHEMISTRY

Edited by R. Thompson

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Energy and Chemistry

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The Industrial Division of The Royal Society of Chemistry
as part of the Annual Chemical Congress, 1981

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PREFACE

For its contribution to the first Annual Congress of the Royal Society of Chemistry, the Industrial Division chose as a theme the interrelationship of energy and chemistry in everyday life. The object was to review in widest aspect the role which chemistry plays in the generation of heat, both by combustion and radiochemically, and its efficient use. Of complementary importance are the intelligent utilisation of finite fuel resources (with competing demands as chemical feedstocks) and the conservation of heat by improved thermal insulation, as well as the social and environmental consequences of operating various exothermic and potentially polluting processes on a global scale over long periods of time.

The Organising Committee was fortunate in being able to bring together speakers distinguished in their respective energy-related fields. It was of singular coincidence that the symposium should be held at the University of Surrey, situated in Guildford and thus in the constituency of the Rt. Hon. David Howell M.P., then Secretary of State for Energy. We are grateful to him for both opening the Congress as a whole and for delivering the keynote address, which is reproduced in full as the first chapter of this publication. Thanks are due equally to all other speakers, not only for participation at the symposium but for providing camera-ready copy from which the book has been produced in an endeavour to make this unique collection of papers available as rapidly and inexpensively as possible.

Raymond Thompson
Vice-President, Industrial Division

Organising Committee

R. Thompson (Chairman), H.L. Bennister (Secretary), J.I. Bullock, W.D. Halstead, C.A. Morgan, G.F. Phillips, P.V. Youle.

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Energy and Chemistry

By Rt. Hon. David Howell, P.C., M.P.

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The Energy and the Chemical Industries share a number of common features. Both play an increasingly important role in our daily lives. Indeed it would be no exaggeration to say that both Energy and the products of the Chemical Industry are quite indispensable to modern society as a whole. I have sometimes compared the role of Energy in society with that of oxygen to the human body. If I were to extend this analogy further - I would think that there is a close parallel between chemicals and the vital trace elements in the body structure itself. Energy and Chemicals are absolutely essential for health, for human progress and for economic growth.

Energy and Chemistry also interact with each other in a very special way. Many energy production processes involve chemical reactions and industrial chemists play a very significant role

*Now Secretary of State for Transport.

in our Energy Industries - the Electricity Industry, the Coal Industry, Gas, Oil and the Nuclear Industries. There are a number of chemical processes which depend in turn on abundant energy supplies, and some chemicals - such as chlorine-are very energy intensive. So there is this close mutual inter-dependence between our two areas of work.

The common ground does not end here.

There are also certain constraints under which we both operate. The problem of long lead times, the pressure of technological change, the increasing burden of massive financial investment, and the uncertainties of future demand and public acceptability are some of the factors which we have to contend with in this increasingly difficult business environment of today.

Oil Price Revolution

Our two industries are also exposed to external influences, particularly those operating at international level. One such influence is the price of oil and other energy sources as basic commodities. There has been a succession of continuing crises and shock waves first administered in November 1973 and repeated in 1979 and again most recently last year. The reality of this oil price "revolution" has however only just begun to register with some people, with the result that there exists today an enormous lag between the shock and the response.

Step changes, such as we have experienced in oil prices, were once phenomena of rare occurrence. Today, it is only realistic to expect the price of oil to continue rising in real terms over the next two decades perhaps even to twice its present level. This process may be uneven: there will be times of slackness

and times of sudden increase. But this will be the trend. The reverberations of these price increases, like ripples in a pond, are felt over a wide area. Only in this case however, the "ripples" are more like gigantic ocean waves!

Some months ago I hesitated using the term "Revolution" to describe the energy events of the last 2 years. On reflection, I am inclined to think that "revolution" might not be quite the hyperbole that some thought it was. Not only have the oil price rises been massive - but the adjustment process will involve a response of equal scale. Social habits and industrial patterns will have to change, and attitudes will need to be transformed with them. But what is almost certain is that the world in future cannot hope to enjoy cheap and plentiful supplies of energy as it was accustomed to in the 60s and early 70s.

Future planning

This then is the challenge which you in the Chemical Industry and we in Energy must face and overcome. The backcloth against which we both must plan and formulate our strategies and policies is one of increasing scarcity of oil. In our view oil is likely to remain the world's marginal fuel for many years to come.

Energy today is a highly political commodity, especially energy which is traded internationally. At the moment this is true of oil, but in years to come gas and perhaps even coal traded on the world markets might be subject to the same sort of uncertainties. Who knows? This "political" dimension is clearly important for both our sectors as we plan for the future.

I know that the Chemical Industry is keenly aware of the problems facing it in the future - not just on Energy Costs, but in international trade and technology generally. Your industry has a splendid track record of high productivity, high profitability and high growth, particularly during the 60s and early 70s. I am sure that your traditional resourcefulness will enable you to weather the storms of the current recession perhaps better than most other industries.

Key changes

From my perspective as Energy Secretary, I should like to mention certain key influences which could have a bearing on your industry's performance over the next few years.

The Chemical Industry is still a relatively young and growing industry with enormous potential in the future. The energy revolution which has hit the industrialised world may be an extremely difficult episode in your industry's history - but I am convinced that out of it will emerge a new structure which will be in condition to respond to the changed circumstances of our time. Man's material progress on this planet has been largely due to his achievements in the field of science and technology. We rely on this process of discovery and innovation continuing in the future. I see the rise in oil and energy prices, disagreeable though it certainly is, as being a spur to greater innovation and ingenuity in the chemical sector as well as in a number of leading industrial sectors.

Change, although disconcerting in the short-term, provides new demands, and therefore new opportunities for industry to meet

those demands and to make profits. Without change, there cannot be growth.

The change represented by higher energy prices is all-embracing. It affects all consumers in all the places where they use energy: homes, schools, hospitals, offices, shops, factories, cars and aircraft. Because of that, the new opportunities are also widely spread and at all levels of technical sophistication.

This country will be looking for ever-improving home insulation materials, improvements on heating control systems; new technology to improve heat recovery, and heat pumps; efficient coal boilers to replace expensive oil-burners; micro-circuitry to maximise energy saving; new materials for lighter cars and aircraft; and new car and aircraft engine designs.

This revolution is being led by small businesses as well as large. At the simpler levels of better housekeeping to save energy it is recruiting entrepreneurs who have never before been in energy-related activities. It is an engine of development and growth.

Energy saving in the chemical industry

There will be great scope for energy saving in the future as chemists devote more of their research and development resources to devising new products and processes which are more energy efficient. The cold water detergent is just one development which could perhaps be the forerunner to a new generation of products, which will be "winners" because they are energy efficient. A programme for innovation based on the prime objective of reducing the energy content of products and

processes could be central to the Chemical Industry's strategy for the future.

I noted a recent survey by the Council of the European Federation of Chemical Industry - which showed that energy savings of approximately 2% per annum have been achieved between 1974 (the year of the oil crisis) and 1979. Most of these savings have been made possible by the improvement of the production operations and processes, and by changing the mix of products in favour of those which are less energy intensive. It is encouraging to note that over the years there has been a reduction in liquid fuels consumption, as well as a gradual reduction in the use of solid fuels. Most of the increase during this time has been provided by gas.

Energy strategies: alternative sources

The industrialised world's Energy problem is to achieve a smooth transition from an energy economy based predominantly on oil to one which makes much greater use of alternatives - coal, nuclear, energy conservation, and in the longer-term the renewable sources. That this be achieved without supply interruption is a major task. It is one for which I, as Secretary of State for Energy, have responsibility.

The broad objective in Energy policy, as I see it, is adequacy and security of energy supplies, efficiency in use, at optimum resource cost to the nation.

Adequacy of energy we certainly have, and security of supply must surely be one of our greatest assets today. Efficiency in energy use is being pursued very vigorously both by my

Department and by the Energy Industries. It is my policy to promote efficiency and competition in the Public Energy Sector so that the consumer may benefit from better service and keener prices.

We are working hard to achieve that successful transition from an economy based on oil to one based on the non-oil sources. We have never pretended that transitional help will not be needed in this process. For example, the substitution of oil by coal in the industrial heating market is an important part of the overall programme which we envisage for coal in the longer term. The £50 million grant scheme which was announced in the Budget recently is an important first step towards achieving this goal. The proposed expansion of our Thermal Nuclear Power Programme which I announced in December 1979 is the second prong of our strategy, and the increasing importance given to Energy Conservation is the third.

R & D and marketable energy conservation

Nor are the renewables in this overlooked at all. We regard them as being vital in the longer-term. But new technologies take time to develop, as you in the Chemical Industry will appreciate only too well. Time must also be allowed for the important demonstration period in order to prove the technology and the product. In many cases the lead times are extremely long and often the commercial potential at the laboratory stage is far from clear. In such instances, it is a valid function of Energy policy to provide the sponsorship which is needed to take the technology up to the Development and perhaps even the initial Commercial Stage. However, Government-funded Research and Development must be geared to the creation of market

opportunities which can then be exploited by the Energy Industries and the private sector.

The product must be marketable, because the opportunities are enormous. There is a potential British market worth well over £1 billion for converting oil boilers to coal in industry. The market for Energy Conservation technology hardware will also be very lucrative. So the list of opportunities can be multiplied.

The Government backs up its policy of ensuring that the price signals are right by a strong programme of publicity and advice, and by funding demonstration projects and contributing to research on new technologies.

Government contributions

Information is the vital key to saving energy. Our information budget has risen this year by 30 per cent in real terms. Where we find that one company is saving £1 million a year from its £7 million energy bill through staff education, improved lighting and heat recovery we give that publicity so that other firms can see the opportunities that are open to them. We encourage both the appointment of energy managers and the formation of energy manager groups where they can trade information.

The Government funds the Energy Thrift scheme which provides one-day visits by consultants and industrial research associations who can give advice on basic energy-saving improvements. By next year nearly the whole of manufacturing industry will have been covered.

The Energy Audit scheme, also run by the Government, looks at sectors of industry in much greater depth, and aims to recommend major improvements in industrial processes to bring about substantial savings.

Government contribution to energy conservation research and development is running at about £9 million this year. In industry that work is concentrated on recovery and use of waste heat, instrumentation and control, waste as a fuel, heat pumps and combined heat and power. In transport, we are sponsoring R & D on engine and transmission development and the application of micro-processor control to vehicle functions.

We contribute 25 per cent of the capital costs to projects demonstrating novel energy saving technology - like the project in the glass container industry which is saving 55 per cent in primary energy terms. The total budget for the 80 projects currently being funded is £17 million, of which £4 million comes from the Government.

Government guidelines

In each of these areas - information, research and development and demonstration, the potential savings if widely applied are enormous. But the way to bring about these savings is not to pour in billions of pounds of taxpayers' money. If these savings are to be achieved in fact it will be through the constant drive of British management to cut costs in the face of higher energy prices. Government spending could never supplant or reproduce the effects of that industry-wide pressure and effort. But we do have a duty to help industry to see its own way out of its present difficulties: to present

it with vivid illustrations of the opportunities. That is a policy which we are pursuing with great vigour and with remarkable results.

I know that this audience will be well aware of the opportunities which lie ahead over the next few years. Prospects are, I believe, now improving. Government has recognised the difficulties which industry faces in the short term and is helping. I have already mentioned the boiler conversion scheme. The Chancellor, as you will know, has also provided help for the large energy users. I hope these measures will help and encourage industry. The Government wishes to bring relief as far as possible, through its industrial and trade policies, to those who are caught up in the problems of transition. But more than that, I believe that Britain will soon emerge from the world recession, and when we do I am confident that the British Chemical and Chemicals Related Industries can move from strength to strength.