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ENERGY IN THE 1990'S AND BEYOND

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A workshop presented by Peter James

at the Graduate school of Business, University of Cape Town
on Thursday, 23rd May 1991

Peter James is presently assisting in strategy development at Scottish Nuclear, a newly formed nuclear generating organization. He is the author of a standard text on the international coal industry, The Future of Coal, as well as a number of other publications. He has previously reported on energy issues for the BBC and Electrical Review.

Peter James introduced the topic by discussing the underlying trends of the past two decades and the impact they have had on the world energy scene.

Of significance to the energy community is the fact that the energy predictions of the 1970's and 80's did not come about. Energy demand grew less than expected. Oil prices were at first higher than expected, then much lower. There has been a marked change in energy carrier consumption patterns. Oil consumption has been much higher than expected, while coal and nuclear growth have been much less than anticipated. Renewable energy had less impact than was hoped for. Most surprising was the boom in the consumption of natural gas.

Peter James then went on to explain the reason for these surprises.

Firstly, he claimed that sufficient economic forecasting had not been carried out and was based on classical theories which did not model the dynamic nature of the energy economy adequately. Institutional factors such as the organization of oil markets, inter-government interaction, and the liberalization of gas and electricity supply had a great effect on consumption patterns. There had also been social change manifested in the environmental and green movements which have had a significant effect on the politics and economics of the energy industry.

The liberalization of the electricity and gas supply was then discussed in more detail. This process was started in the USA, closely followed by the UK, and is spreading to Europe and beyond. Liberalization has resulted in privatization, changes in regulations, and vertical disintegration within the industries. The vertical disintegration has resulted in the production, generation and distribution functions being separated into individual businesses, thus helping to establish market relationships. Privatization has also led to the establishment of regulatory bodies to police the energy industries and to safeguard the public. These bodies are unexpectedly strong and have been able to bring increased political pressures, mostly driven by environmental issues, to bear on these privatized industries.

An increasing number of commercialized energy utilities are emerging with a bias against capital investment due to the inability to guarantee returns and the risks involved. They are rather purchasing in supplies from other utilities within

their country or from foreign utilities as well as employing alternative technology to maximize efficiency. This has resulted in a greater emphasis on demand side management. These commercial utilities are finding the cost of providing new supply so expensive that it is often cheaper to manage the demand side more efficiently so as to extend the existing supply and reduce the need for capital expenditure on new supply. The electricity utilities are doing this by remotely controlling domestic appliances especially at peak times, implementing sophisticated pricing schemes and spot pricing mechanisms, subsidizing the purchase of more efficient equipment by customers and importing supply from other utilities with spare capacity.

The separation of the production, generation and distribution functions and the subsequent establishment of market forces within these sectors has resulted in more efficient utilization of existing infrastructure. In Britain major industries have a choice of electricity supplier and will thus purchase from the cheapest supplier at any given time. As the price of electricity is function of distance from supplier and an inverse function of excess capacity, market forces will ensure that existing resources will be used efficiently. Due to this liberalization as well environmental concerns, new entrants into the electricity generation sector have emerged, the most significant being the increasing use of natural gas.

Of interest in regard to the privatization of the electricity industry in the UK is the surprising ease with which the grid adapted to the new system. It is now accepted that a much more complex grid system is possible than was presumed in the past. The relaxation of regulation on coal purchases by the

electricity utilities has raised the debate whether it is necessary for the UK to have a coal industry at all, taking into account the lower cost of imported coal and the environmental costs of local coal production.

Peter James commented that the formation of the EEC in 1992 could result in major changes in the electricity industry due to blanket regulations which are envisaged. A case in point is the proposed audit of the French Nuclear Industry by the European Community in order to ascertain whether EDF tariffs reflect the true cost of nuclear power. The result of this could determine whether France will become a major exporter of 'cheap' nuclear power or not.

The discussion then focused on natural gas. There has been a 100% increase in natural gas production since 1970. International trade in natural gas has flourished. A reserve reassessment has established that there are substantial reserves of natural gas contrary to the beliefs of the early 1970's. Natural gas has become the fuel of choice of American and European utilities.

The question, Why has natural gas been so popular with consumption booming beyond all predictions?, was then addressed. Natural gas has a lower environmental impact than coal and oil and is more acceptable to the public and politicians than nuclear energy. Its emissions of SO_X, NO_X and CO_2 are less than those from coal or oil and this together with other factors has given it an image of a cleaner fuel, enabling utilities to gain optimum plant siting permission much more effortlessly. Capital costs are lower than for other fuel types. Institutional changes, specifically the liberalization of gas supply, have made it an attractive fuel.

The reserve reassessment has guaranteed security and stability of supply and has won the confidence of the users. The emergence of so-called gas grids in Europe which are shared with other sectors of the economy have made natural gas an attractive option. Peter James envisages continent-wide gas grids in Europe (including Britain) with connections tapping the vast Russian reserves. He also mentioned that, due to the great number of projects utilizing gas presently under construction and planned, there is the possibility of a gas price 'crunch' in the late 1990's. However, utilities have confidence that coal gasification will have been perfected by then and they will be able to switch to this source of fuel at an acceptable cost if necessary.

The question, Why is gas transported to the electricity utilities rather than siting the power station at the gas field?, was then raised by a member of the meeting. Peter James answered by saying that the cost of the pipeline was shared with other sectors of the market who also utilized gas, whereas transmission lines would have to be financed by the electricity utility itself. In Europe, and to a greater extent in the USA, one of the biggest constraints is transmission capacity due to the lack of space and environmental group pressure; whereas transport of gas in an underground pipeline is space-efficient and is environmentally more acceptable.

The debate then shifted to the nuclear scene. At present only France and Japan are actively building nuclear plants. Opposition, mainly from the public, to nuclear power has been increasing, and most other countries have a 'nuclear freeze'. The nuclear industry's image was severely tarnished by the Chernobyl accident and the fact that the reliability of

nuclear installations has not been as high as was hoped due to unexpected problems. Nuclear technology is seen by many as not having matured yet. Parties promoting the nuclear industry are using the greenhouse effect as an argument for nuclear electricity generation.

The present thinking in nuclear circles is that nuclear energy is too complex and sophisticated for many utilities, nuclear designs need to be standardized (EDF is a good example), nuclear designs need to be simpler, and more effective management of radiation hazards is necessary (especially in the areas of safe, effective waste-handling), and the improvement of both western and non-western standards and the problems associated with decommissioning need to be addressed. Fusion is off the agenda, and a senior member of CEGB has been quoted as saying that it will not work. There is a growing belief that due to the plentiful uranium supplies, technical resources should be used to improve conventional nuclear designs rather than to develop breeder and fusion reactors, and reprocessing of fuel should be delayed until it is the only option left.

Peter James then gave his own thoughts on the future of nuclear power:

Many people, including EDF and Government Ministries, believe that nuclear power will be revived. However, the nuclear industry still does not have an acceptable package. He believes an acceptable package would consist of:

* predesigned inherently safe reactors optimised for safety,
* no reprocessing of spent fuel,
* payment of high compensation to communities near site,

* independent waste management/decommissioning agencies, and
* remote siting of power stations where either electricity will be generated and transmitted or hydrogen will be produced via electrolysis of sea water and piped to markets (hydrogen economy).

Environmental issues and the effects of environmentally motivated policies and regulations were then discussed. A major player in future energy strategies will most probably be the introduction of carbon taxes and environmental audits. The introduction of environmental audits whereby imports into First World countries will be allowed only from those countries who practise acceptable environmental controls could result in a two-tier Third World: those countries which are able to meet environmental standards acceptable to the First World and those that cannot. The First World has a moral obligation to help Third World countries attain standards and regulations imposed on them by the First World. Whether the First World will meet this obligation and if so to what extent is open to debate.

A knock-on effect of the increasing environmental regulations in the First World is that many environmental decisions are being taken out of the hands of the Third World as international companies are producing only 'First World' products/components. This could have a dramatic effect on the Third World motor car and petrol industry.

The economics of the coal industry have been transformed by the environmental debate with demand and prices lower than expected. Today coal is seen as a 'dirty' fuel. However, the perfection of coal gasification technology could bring about a reversal of this situation.

In the past the environmental debate has been driven by emotions resulting in some foolish if not impossible solutions being put forward and implemented. Solutions to environmental concerns are increasingly being driven by market incentives instead of by government legislation. Market solutions are the big 'trend' in the environmental arena.

Peter James then summed up by saying that in his opinion renewable energy and nuclear energy can be ruled out as major players in the short to middle term. Natural gas, energy efficiency and demand side management will emerge as the key players in the energy sector, although oil will still play a significant role. Transport is emerging as the 'No. 1' environmental issue and it is generally accepted that the utilization of cars needs to be curtailed. He said that by implementing good market systems and basing environmental solutions on them the future will look after itself, allowing us to concentrate on more important matters in the short term.

Institutional factors drawn from the international political sphere are going to play a major role in future energy policies and strategies.

Peter James said that the international community was hoping that South Africa could lead the way in finding solutions to Africa's environmental as well as energy, food and economic problems.

Comment

Although the presentation was very interesting it was based mainly on the UK (and USA) energy industries and especially the UK electricity industry. It was presented very much from a First World perspective, with little insight into the complex and unique aspects and problems of the Sub-Saharan energy scene. Peter James failed to demonstrate adequately the effects and implications of the past and future First World energy consumption patterns and trends on our region's energy sector and the relevancy of the content of the presentation was questioned by P. Beaty of Mobil Oil.

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