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Editor Christopher Payne

Assistant Editors Joan V Deakin BA Sharon Dorrell BSc

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Viewpoint

ooking to acceptable actions in an unacceptable climate

here are only a few points of certainty arising out of the present political climate in S Africa; one of them is that the world looking for an end to apartheid through peaceful means and as soon as possible. The energy industry in South Africa plays f course a key role as both an extensive employer of black, blue-collar, South Africans and in keeping the government economically uoyant and self-sufficient. The Institute of Energy, in its corporate expertise, contributes to this industry through the representative outh African branch. It is timely to discuss now the Institute of Energy's involvement there.

The issues are many and complex, with rhetoric and inaction to match. The natural conservatism of engineers invariably expresses self in silence over what is presented as an exclusively political issue. This, however unintentional, may smack of complacency nd apathy; but it is evident that leaving South Africa to her present policy and course must lead to increased strife. The Institute f Energy has surely to clarify its stance lest accusing fingers be pointed at us in a future, hoped-for time of changed circumstances, nd posssibly that of a future black majority government. It is true that we are a relatively small organisation in South Africa 31 members — surprisingly no blacks), but our silence will not be recognised as a patient, apolitical act. It might easily be misconstrued as a rather pliant reaction, or non-reaction.

There are other British professional bodies who have adopted a moral stance in the matter. It is all too easy to shrink from ur collective responsibilities, by seeming not to be wanting to 'interfere' with our South Africa branch, leaving them quite utonomous in the matter. While we may empathise with individual members in South Africa, as a collective group they represent he Institute as a whole. Certainly *our* perspective may be shaped to one degree or another by biased media coverage; but *their* udgement can be equally suspect due to conditioning, and indeed to the fact that their livelihood is dependent on it.

There are certain moderate measures that would firmly convey our genuine concern, without undue hardship to our South frica membership. Statements need not go as far as deploring named culprits (there is violence at either extreme). A general tatement denouncing violence from all sides may suffice — although I know from a long conversation with the present chairman of the South Africa branch that even this simple action is fraught with difficulties. Their government might, for example, withdraw ll financial support for the South Africa branch and, since the branch is not self-sufficient, it would collapse without such aid. s there not then a case here for treating the branch as a special case for funding, releasing it from the South African government's apron strings. Other financial measures might also help: for example within the membership of the Institution of Chemical Engineers South African branch there are black members, which may in part be ascribed to a much lower membership fee by comparison. The Institute of Energy in not subsidising the fee unwittingly discriminates against the poorly paid engineers — he lower management blacks. If, after all it is possible to put up a case for lowering student fees generally, on hardship grounds, surely a positive concession in the South African context is an equally cogent argument. The action too, would be in line with he Institute of Energy's present concern in helping developing countries. We should not confuse the greater impoverished black communities with the developed environment of the Caucasian: we are talking of a land of two countries.

Nor need all measures be financial. Steps could be taken in more general sense to encourage recruitment from the black community. A simple statement written at the bottom of posters, and in application forms, could follow similar lines to that recommended by the Equal Opportunities and Racial Equality Acts; that membership and attendance at meetings are open to all, regardless of race, class, colour, creed or sex. No one should regard this as provocative. The Institute of Energy is a key professional body, whose members contribute to crucial aspects of this country's economy; but its membership collectively should meet the wider responsibilities that lie beyond the arguably narrower confines of technical engineering.

Olinga Ta'eed

*Industry Year 1986: lecture**

Industry and wealth creation — the human factors

Sir Geoffrey Chandler CBE†

In introducing Sir Geoffrey Chandler, Lewis Tozer, the then chairman of the London and Home Counties branch of the Institute of Energy, said 'The economic and physical well-being of a modern, industrial society depends on the resources, both quantitative and qualitative, available to it. The United Kingdom is unusually rich in resources - the intellectual resources to conceive and innovate beneficial change, the technological resources to create change, the financial resources to implement change and, above all, the energy resources which make material change possible. Indeed, social advancement has depended on the effectiveness with which energy resources have been developed and exploited. Coal and steam gave birth to the industrial revolution in the 18th century to be followed in the 19th century by the technological revolution which led to the rapid growth of electricity-based industrialisation and the high technology which shapes today's world. Yet, uniquely among industrial nations, energy-led prosperity has eluded us. The reasons will be more apparent if, guided by Sir Geoffrey, we consider 'The Human Factors' resource.'

I believe that the problem and challenges we confront are not problems of science, but human, political and cultural. And those problems are the more difficult because they are unquantifiable, intangible, and subjective. The sociology of industry is understood and studied far less than the technology of industry. But at the the end of the day, management is about people and the aim of industrial success is man and woman. And I will argue that unless we put our minds to the human, political and cultural problems to a greater degree than in the past, our full development as a country - and indeed the full application of science and technology - will continue to be frustrated and our economic success will continue to lag behind that of our competitors.

The background to everything we do, conditioning everything we do, is the fact that for many decades this country has been outperformed industrially by its major competitors. The key question we therefore have to ask is why is it that this talented and highly inventive nation, with its disproportionate share of Nobel prize winners, and a music and theatre unrivalled in the world, has performed so much less well in response to the challenge of competition in the market place than have our competitors in France, Germany, Japan and the United States.

'that relative decline has been steady, continuous and consistent'

The facts are incontrovertible. If you go back 130 years, this country was at the pinnacle of its industrial pre-eminence, we led the world. That was marked by the Great Exhibition of 1851, which, like Industry Year 1986, was an initiative of the the Royal Society for the encouragement of Arts, Manufactures and Commerce. I deliberately give its full title because it reveals its 18t century origins and the fact that it is unique amo institutions in this country in bridging the aesthetic a the practical, the academic and the applied, which o education has for so long kept in separate compartment

But, 130 years ago is remote from all of us. If we g back only 40 years our standard of living was then secon only to the United States. Today, little more than half modern lifetime later, our standard of living is almost the bottom of the industrial league; only Italy was belo us at the last count and by today may well have surpasse us as we may have continued our inexorable path to th bottom. We have grown, but others have grown faste and that relative decline has been steady, continuous an consistent over the last few years, regardless of th complexion of government.

Today we see North Sea oil revenues peaking an beginning their gradual decline. We have a deficit in ou trade in manufactured goods which happened for the firs time in our history in 1984. Service exports, althoug growing fast are also, like manufacturing exports, fa losing market share to our competitors. To say this is nc to denigrate Britain: such accusations represent an ostrich like posture which only the comfortably-off can afford It is also to challenge this country with facts. These ar facts - demonstrable and quantifiable and we have show ourselves, historically, to be a country that is good a responding to harsh facts when they are fully exposed t us. The most serious problem we confront today is th erosion of our productive capability and the most seriou question we confront today is: how will we create th national wealth, on which everything depends, to sustai our needs in the future?

'Without a manufacturing industry the skills of this country will be left to lie idle'

These are certain myths abroad which need to b dispelled. The first is that growth does not matter, fashionable doctrine in the 1960's. All I would say is tha the litter of unfulfilled aspirations lies visibly around u

*Given to the London and Home Counties branch of the Institute of Energy at the Royal Institution on 14 January 1986.
†Director, Industry Year 1986

d that hostility to growth is a conspiracy of the haves ainst the have-nots.

The second myth is that growth is a zero-sum game and at for every economic advance in Britain or the veloped countries there is an equal and opposite loss the developing world. The whole of post war history spels that myth: it is only by growth in the developed orld that we have been able to trade with and import om the developing countries. One of the tragedies of ir relative economic incompetence is that we have not en able to trade sufficiently with the developing world indeed assist them in terms of aid.

And the third myth is that we can live by services alone id that manufacturing is old hat: that we can slide acefully into what is called a 'post industrial economy,' e cannot. We are absolutely dependent as a trading ition on the overseas earnings of manufacturing, quite part from the fact that services are in many cases pendent on the health of manufacturing industry. loreover, without a manufacturing industry, the skills many people, the skills of this country in particular, ith its great industrial heritage, would be left to lie idle.

We do not have to fail. The paradox of our rformance is that overall relative decline has been companied by the existence of first-class companies that e internationally competitive. We export radar to the nited States, pharmaceuticals to Japan, and even high uality clothes to Korea. In other words, we know what do in design, quality, in management and work ractices. So the question becomes; if we know what to o, why don't we do it? Again I would say this is not a roblem of knowledge, or technology, or science.

'he only Britsh disease is blaming other eople'

Ve are good at identifying scapegoats: the City, trade nions, Government and management. But they do not t the diagnosis. If the first three—City, trade unions, and overnment were angels, transmogrified tomorrow, they ould not, in fact, affect the quality, design, or marketing f products, all of which are management responsibilities. o perhaps one should pause on management because anagement is pivotal, but again, in elaborating the anifest inadequacies of management in general, all one doing is describing a problem rather than assigning a ause. Others adduce the possession of Empire or our ailure to lose a war as reasons for our relative industrial ailure. But if so, why was it only our ability to run ndustry successfully that was corrupted, while other walks f life — theatre, music, the learned professions have all ourished? Again the explanation does not fit. It is evident nat the only British disease is blaming people other than urselves.

It is increasingly clear that we are all responsible for vhere we stand and that the root cause of our long relative ecline — now statistically measurable over something like hundred years stems from an inherited culture and a set f attitudes, reflected in and reinforced by our education, vhich puts industry at the bottom of the social pecking rder, and leads our most talented children to put industry ast, or near last, on their list of occupations. Indeed you vill hear parents and teachers positively encouraging the nost talented not to go into industry.

We are in fact an industrial country with an anti-ndustrial culture and in this we are unique in the world. No other country suffers from this cultural hang-up: it s therefore hardly surprising if our industrial performance n its generality should reflect the lack of esteem in which ve as a society hold it.

It is culture, this set of attitudes, that Industry Year 1986 is out to attack. It clearly finds an echo because the response has been astonishingly positive. Fifteen months ago we had virtually nothing. Today we have a nationwide organisation involving distinguished people from all walks of life throughout the country to a degree, I believe, unprecedented other than in wartime. We have had this response because people find their experience and perceptions an echo of this truth about culture and attitudes. We have the support of companies and CBI, trade unions and TUC, Government and Opposition, women's organisations, the whole spectrum of education, and indeed the church. There are some 40 secondees from industrial companies and other organisations posted to the Industry Year regional network round the country. To change attitudes is not enough in itself, there are other things that urgently need to be done: but unless we change attitudes, there will be no solution, and we will continue to deal with symptoms and apply palliatives as we have for so long in the past. And we will be dead in the long run.

'Our job is to identify good practice and see that it is multiplied in the community'

Our method in Industry Year is guided by two principles. First, that you change attitudes not by exhortation or pontification but by changes in performance and behaviour built into the work and life of the community. And the second, perhaps it isn't a principle, it's an observation, is that we need invent nothing, because just as in industrial performance, there are first-class examples of what ought to be done. Our job is to identify good practice and see that it is multiplied in the community where the viscosity of the environment (if I may use that term as a former oil man) prevents such practice automatically spreading to those who have not yet adopted it. The third principle, and again it is a fact, is that in no way will we change 100 or 200 years of attitudes in 365 days. Industry Year is a lever for change which must go on until we have solved the fundamental problem.

Industry Year is about action. One of our chief targets is the link between education and industry in which we are setting, in agrement with the educational world, very specific targets: every secondary school, and as many primary schools as possible, should be linked to local industrial companies; in-service teacher training should be increased so teachers can come into industry, if only for a week or two, to see that it is a human and technical challenge and not a stereotype. Those targets or objectives spread all the way from primary education to further and higher education, to universities and polytechnics. In this there is a challenge to all parts of society and in particular a challenge to industry, because industry reflects the problem we are attacking. But if industry does not respond to the challenge of education today then we will not succeed in bridging the divide which exists. I would therefore hope that every one of you in this room will play a part.

'Government and industry need a target for training'

I have said that if we fail in this, we will be dead in the long run. But we can be dead in the short run if we fail to tackle certain other things. I would now like to turn to the human side.

If the most chilling fact of the last 18 months was our

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deficit in manufacturing trade, (though it was passed by with remarkable complacency in the country), the most chilling report was by NEDO and the Institute of Manpower Studies that compared our education and training with that of Germany, Japan and the United States. The report pointed out that both in quantum and quality our education and training are way behind those countries. We have, therefore, a guaranteed built-in inferiority until we remedy this. Government and industry need a target for training not just improvement on our own inadequate past, which matches our competitors, such an effort which should be financed by industry and government.

A revolution in education is now taking place, the most significant revolution for a hundred years: there is change in the curriculum; a modification of our procrustean examination system; there is also recognition that making, designing and organising are all as important as the accumulation and critique of knowledge on which our education has been based since the villain of the piece, Dr Thomas Arnold, went to Rugby in the 19th century. He said that the ideal of an English gentleman was someone as far removed as possible from making money. And at Rugby they did not even teach science.

Our development of human potential is inadequate, so is the harnessing of potential in industry — harnessing the abilities and enthusiasm of a workforce by their involvement, by a sense of identity of interest with that of the company for which they work. The question of involvement, of participation — I prefer this to the term 'industrial democracy' which gives political overtones to a human problem — is debated every year by the CBI, repudiating any concept of legislative stimulus and vital human need of capturing people's enthusiasm creeps forward with such painful and inadequate slowness that we are still way behind our competitors and the gap probably continues to grow. More energy is spent in condemning what is known as the *Vredeling Initiative* and the *Fifth Directive* than in getting laggard colleagues to perform better. I believe there is a Gresham's law of industrial relations. Gresham's law said that bad money drives out good. Unless we involve people more quickly than we are doing, and more successfully, it is predictable that we will have and deserve political solutions which will impose a Procrustean bed even on those companies which already perform successfully. Given the slow speed of change and the prospect of it continuing to be so slow, we probably no longer have a choice between voluntaryism and legislation, but between compulsion guided by industrial and human considerations, which are relevant, or guided by political consideration, which are not.

'the political processes in this country are inimical to industrial success'

If I turn to my third category of politics I would say quite bluntly that the political process in this country is wholly inimical to industrial success. We start with a parliament, Government and civil service almost entirely innocent of direct industrial experience. Parliaments have few people in them with direct industrial experience, governments therefore, by definition, even less. Governments also suffer from the damaging belief that ideology is relevant to production. It is relevent to distribution, to the distribution of wealth, but I believe it has little if anything to do with the creation of wealth. We have, moreover, an electoral system which has exhausted both its equity and its utility. It has led to violent swings of policy affecting industry both between and within governmen You can identify quite clearly six significant changes policy towards industry over the past 13 years. This occu because governments come in with ideology initial prevailing over industrial imperatives, then gradually a belatedly industrial imperatives prevail over ideology do not believe that we are likely to change this in the sh term. It is not within our power as industrialists to do And I do not believe in a government of businessm or industrialists and therefore a damage limitation exerci is needed. You cannot blame politicians if industry fa to defend its own corner and industry has indeed fail to defend and fight its own corner. It has failed to be t countervailing power which is essential if a plural socie or a democracy is to operate successfully. As industry h not fought its corner, government has filled the vacuur

There is no consistent and continuous input fro industry to government and opposition about measur which affect industry, whether directly, through industri policy, or indirectly, through energy pricing environmental legislation. There is no coherent view fro industry: the Westland dilemma is a classic case about t role of government in a world where government inextricably linked to industry, whether you like it or no and where our competitors have a more intelligent ar consistent relationship between government and indust that we have.

Our main industrial institutions, the CBI and the TU are more conscious of their divisions at a political level th of their common interests at industrial level. A man woman from Mars would be astonished that we fail see that our common industrial interests are infinite greater than any interest they may have with any politic party of any complexion. I think we have to be doubtf if existing institutions can fill this very real gap. I therefo believe there is urgent need for thinking managers ar thinking trades unionists to consider how they can provi what I would call 'an industrial opposition' which is sho of party politics and limits the damage which the politic process has done to industry. It would need to conv consistently into Government and Opposition, t industrial argument and the industrial need — and tho needs are very much more longer term than the perio that we, as a democracy accord to any one governmen I do, of course, believe democracy is essential, but I don think it has to damage the industrial process. If indee we solve the cultural problem then we will solve t political problem, because it would not matter if peop in Parliament or Government did not have industri experience; they would, as in France or Germany, acce automatically that industry is a fundamental part society on which the rest of the country depends and tre it accordingly.

Our preconception that industry is morally and social inferior to the learned professions, to the law, to teachin to medicine, derives in part from industry itself — throug its failure to fight its corner on television, for exampl or stand up and say what its contribution is to societ It is astonishing that many representatives of first-cla companies decline to go on television — the mo powerful communications medium today. They ma make life temporarily more comfortable for themselve they may avoid a battle, but they will lose the war for a of us, because by abstaining, they guarantee a form negative advertising. The media will understandably ar rightly pick up the defects of industry. But if industry do not fight its own corner, nobody else is going to do i

There is a very real battlefield and I think it woul flatter industry to say it had been defeated on it. Too oft it has not even entered the lists. At the end of the da industry's ability to recruit people, to sell its products, t

nner in which legislation reflects the views of society, l be determined by the extent to which industry makes reality understood.

What action can we take? I see no point in having a gnosis without action. Some of the action I have spelt t. I have said that politically I do not believe we are ing to see change come quickly. Electoral reform is not thin our gift. It would be quite wrong for industry to ance any parties which it thinks would change the ctoral system. Political donations from companies to rties or from the trade unions are a corruption of a mocracy based on one person one vote. Action *vis-à-* politics therefore has to be a countervailing voice from dustry, clear and consistent, regardless of the mplexion of government. That does not yet exist, but is fully within the power of industry to develop it.

Ve are all responsible for unemployment'

n the human side, it is fully within our power to do more out involvement and participation and there are many ays of doing it. There is not a single solution for all. But nless we move fast, or encourage legislation which flects the real need, then we are likely to see measures ch as the *Vredeling Initiative, or Fifth Directive,* adopted some political form.

On the cultural side, it is up to every one of us. Industry Year is not 'a good cause', it is not altruism; it is in the self-interest of every person in this country to recognise that they are part of the problem. We are all responsible for unemployment. We are all responsible for the loss of markets. I suppose the only ones who are innocent are the students who have not yet had time to corrupt anybody else.

If I appear impatient, it is because I believe that as a country we face a potential crisis. But it is an unrecognised crisis because relative decline is invisible to those in work, because over time their standard of living has been going up. We have the problem of bringing home to people that this is a serious and potentially critical situation, because at the moment the nature of that crisis is not understood and there is really no serious discussion at national level about it. If I am wrong, and if others who think like me are wrong, it really doesn't matter if I am laughed at, indeed I should be in relatively good company. But if I and others are right, it will be cold comfort to be proved so by seeing a continuing relative decline in this country which could well become absolute if we do not do better in relation to our competitors.

There are no quick fixes; there is a long haul ahead; but time is not on our side and we cannot afford to take too long over the remedy. If I ask the question 'Can we succeed?', I would simply respond by saying that we cannot afford not to.

LETTER TO THE EDITOR

Underground gasification: NCB trials

hen I read the item (as titled above) in e digest section, *Energy World* June 86, p10, my first reaction was a strong nse of 'déjà vu'. The second was the elancholy thought of the best part of a arter of a century wasted by the ational Coal Board!

I read Sir Frederick Warner's letter to e *Financial Times* (3 April 1986) and as stung into replying *(Financial Times,* April 1986). Like Sir Frederick, I am so a survivor of the Newman Spinney roject and of the team that visited the SSR in 1957. I returned from the visit ith the realisation that the pilot project hich had been laid out for us by the ational Coal Board could only have a ry limited success. However we did arn much from the single experiment hich we were allowed to complete (the uch-quoted P5 experiment) but a ecision had been made to stop the work s soon as the experiment was completed. here, as far as experimental work in ritain was concerned, the matter lay ormant for more than 20 years!

However, in 1973 I was fortunate to ome in contact with Underground Coal asification (UCG) work which was then eginning in the United States, and for ie best part of the next decade was losely involved as consultant to the US epartment of Energy, and Gulf esearch and Development. onsiderable progress has been made.

The conclusion which I have reached, nd preached, is that there is only one ensible strategy for solving what is ndeniably a difficult problem. This is for UCG research to be funded over a long period, to establish continuity and to build up a solid background of experimental knowledge.

The alternative of sudden bursts of enthusiasm followed by latent periods leads to loss and dispersion of experienced personnel. When the next phase of interest appears new teams must be built up from scratch.

ARTHUR BALFOUR PhD
(Senior Fellow)
Epsom
Surrey

13th Congress of the World Energy Conference

Needs and expectations will be the theme

The 13th WEC is being held next month in Cannes from 5-11 October. At a press conference in Paris in May the secretary-general, E Ruttley, outlined a history of the World Energy Conference, which is reproduced on these pages, as is also the speech on the same occasion by the chairman of the organisi committee for next month's 13th congress, M Marcel Boiteux

The World Energy Conference was founded in 1924 by Daniel Dunlop, a theosophist and anthroposophist who died in the Rudolph Steiner clinic in Switzerland in 1934. Daniel Dunlop was also an engineer, executive director of the British Electrical Allied Manufacturer's Association and a visionary and it was his vision that created this organisation of power engineers who met for the first time in London on the occasion of the Wembley Exhibition in that year opened by the then Prince of Wales. It was a restatement of man's wish to build a new world after the 1914-18 War and it brought together 2000 engineers, the constructors, from 40 nations: the men who were going to build the power houses of the world in the coming decades. Discussion then, as now, revolved around resources: hydraulic energy, coal, and the new and burgeoning liquid hydrocarbons which were to transform the energy scene of the '40s and '50s (in 1927, when world production of oil was 165 Mt a comparison of annual production and consumption would lead to the 'inevitable assumption that the USA would have only seven years or so before complete exhaustion would take place).'

During the years before the war, meetings took place in Berlin in 1930 when Einstein addressed the Congress on subatomic energy and Sir Arthur Eddington revealed a vision of the world no longer 'pampering the appetite of an engine with delicacies like coal or oil but we shall induce it to work on a plain diet of subatomic energy'. Prof Serruys could state 'sans crainte d'être des novateurs, sans crainte même de paraitre continuer le rapt des sources d'énergie du monde avec le même amour des hommes qui hantait la conscience du ravisseur antique, Promêthée';* then on to London, Barcelona, Tokyo, Washington in 1936 when President Franklin D Roosevelt at the opening ceremony with 'the tiny impulse of electric current which will flow from the touch of my hand' inaugurated the Boulder Dam. On to Vienna when, after the Anschluss, Berlin took over the organisation of the Congress in 1938 and Göring sent his benediction.

It survived the war and was reborn as the Fuel Economy Conference of the Hague and the First World Power Conference in London in 1950 but it remained a conference of power engineers until 1968 until, in anticipation of the changing perspectives of the '70s, it took on the title of the World Energy Conference.

Even before the abrupt realisation by the Arab world of the value of its petroleum resources brought the term 'energy' into the language of the man in the street the World Energy Conference in 1973 had set up its own Conservation Commission to underline the fact that liquid and gaseous hydrocarbons would not enjoy a limitless life and that thought and effort should be given to employing alternatives. In those years when the supply of oil was widely regarded as inexhaustible this was the kind foresight reserved for the few.

The names of great engineers have been associated w the organisation during this period, men like Ferranti, Harold Hartley, author of the Hartley coal report in 19 Lord Hinton of Bankside, founder of Calder Hall a father of nuclear power in Great Britain, Heinrich Man of Germany, Roger Gaspard of France and Peter v Siemens of Germany, all of whom have held high off and been firm supporters of the Conference.

From 1968 onwards, the organisation at its trienn Conferences and through its working parties, has devo itself ever more closely to the interrelationship betw different energy disciplines and the programme for 13th Congress in Cannes will touch on all sectors of energy economy and on all energy sources at all sta from production to end use, coal, gas, electricity, nuclear and renewables, and attempt to bring each i its proper perspective and into a just relationship — a here perhaps is the great strength of the organisati While the gas man will vaunt the virtues of gas, the c man wil defend his resource from all the strictures of ecologists, the nuclear power engineer will argue cheapness of his source of power generation, the oil m the flexibility and indispensable qualities of petroleu

*"With neither fear of innovation nor indeed the "abduction" of world energy resources; but with the same concern for man that, in classical mythology, haunted the conscience of the abductor, Prometheus'. (Prometheus stole fire from Gods for good of man — Editor)

Vigilance today for confidence tomorrow

At the press conference in Paris on 21 May M Boiteux, chairman of the organising committee of t Congress of the World Energy Conference, said tha was every reason to believe that the 13th Congress be a noteworthy event, both for the French community and for the world community as a wh a number of historical and chronological reasons. the first time in the history of the WEC that a congr to be held in France. 'For our country, this is an h a responsibility, and an opportunity. The continu steadfastness of our energy policy since the begin the 1970s have impressed our counterparts in countries. Our technical developments have attrac interest of our partners throughout the world.'

M Boiteux emphasised the chance whereby the would take place midway between 1973 and the yea The year 2000 was drawing near. Yet, he asked, do realize that the threshold of the third millenium, fo years referred to as the 'long term' in prospective was only 13 years away? On the contrary, 1973 marked a major shift in energy strategy, had blur the past, especially as oil prices fell at the beginnin year.

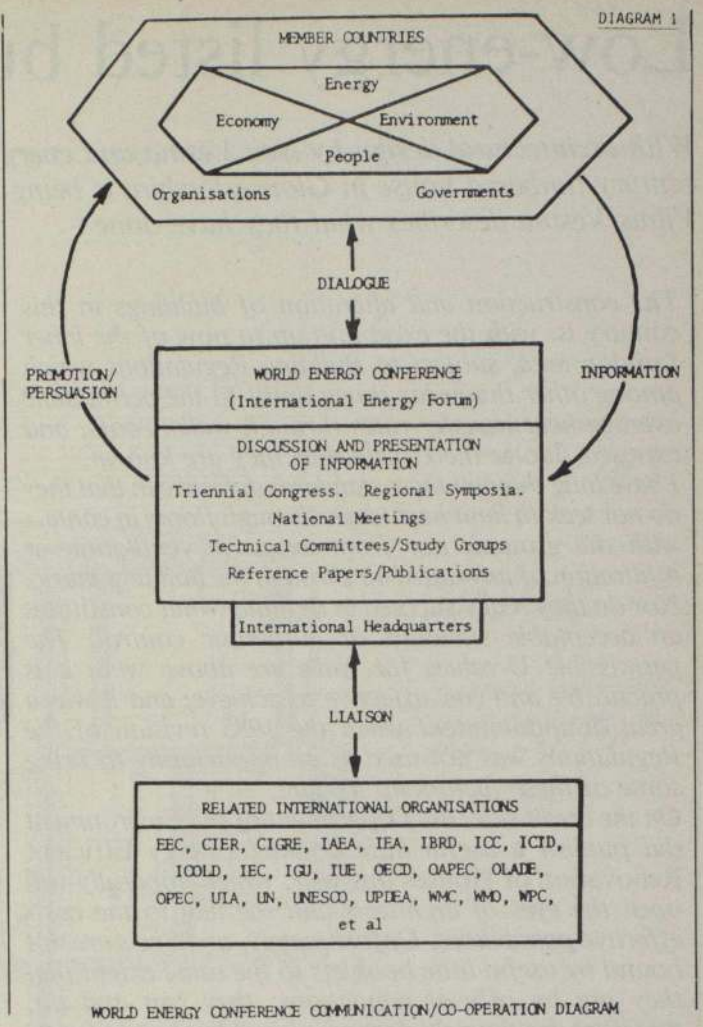
'Are these falling prices destined to cause us, onc to revise thoroughly our goals and policies? In a sec

s in the World Energy Conference that they can meet ce to face, learn something of each other's virtues, and oblems, and emerge as colleagues with a greater derstanding of the technology of others.

I am not going to strain patience with a long account the work of the World Energy Conference in compiling ource data, in producing the only comprehensive survey world energy resources, in its study of problems of new d evolving technologies, of the importance of electricity, a just and proper analysis of ecological problems; the formation is contained in available pamphlets. The agram on these pages shows the relationship between

'The progress of even the most advanced nation is clearly seen to be limited by the conditions of the whole'

ne areas of concern of the World Energy Conference, ne relationships which it enjoys with government and ther organisations and the path it pursues in seeking to ersuade and promote a wise and sensible use of the sources of mankind. Our concern is with the ndustrialised world and the developing world. The latter annot make the best use of its energy resources without ne benefits that the former can confer upon it. As Dunlop aid in 1924, 'the progress of even the most advanced ation is clearly seen to be limited by the conditions of ne whole.' The World Energy Conference brings round ne table equally the engineers from the Centrally Planned conomies and from the Market Economies of the world. t was the second world organisation to bring together aiwan and the People's Republic of China around a ommon table and it does all this because it speaks a ommon language and that is the language of the engineer



WORLD ENERGY CONFERENCE COMMUNICATION/CO-OPERATION DIAGRAM

and the economist, dedicated to the development of energy resources to the benefit of mankind.

E RUTTLEY
Secretary-general, World Energy Conference

weightier than it is flexibile, such a course would be what hazardous and would take time to implement. y event, many people, both inside and outside our ession, are disconcerted by the sudden change in the tion'.

r Boiteux said that the meeting in Cannes would come auspicious time for us to reason more clearly. The ld Conference offered the ideal forum for reviewing world energy situation, alongside its traditional role of ding light on the future. The theme chosen, 'Energy: s and expectations', coincided with the wish to hten the present as the best preparation for the future, time when market mechanisms were causing sharp uations in the price of energy supply. It came at a time competition can only become more intense, not only il producers, but for all energy producers, who will be peting in narrower, more coveted markets. It was also ne when some people were tempted to believe that, as oday, energy abundance had been achieved once and ll.

All of these questions' said M Boiteux, 'and many others undoubtedly be at the centre of discussions in Cannes; without wishing to predict the outcome of those ussions, there is strong reason to believe that we shall l ourselves maintaining and even reiterating the essence nessages from previous congresses, which I might sum in two words: *vigilance* and *mobilisation*.

The analysis of needs will certainly underscore the Third rld countries' increasing share in worldwide demand the unsatisfied expectations of their thousands of lions of citizens. Prices have fallen, admittedly, but the problems still remain. The current situation is the result of chance — in the present instance, the economic recession — coupled with our successful efforts to limit consumption more effectively and our successful policies to find oil substitutes.

'It is up to us to remain vigilant, without letting ourselves be lulled into a sense of security by an apparently easy short-term situation. Should we relax our efforts at the risk of bringing on new setbacks? Or should we persevere in our current policies of combining the use of oil substitutes with rational use of energy, at the risk of sacrificing our competitiveness?'

While there was no simple answer to these questions, M Boiteux affirmed that the course of action remained clear: vigilance today was the key to confidence for tomorrow. 'Our achievements are here to stay and we have high hopes of finding adequate solutions to the problems that beleaguer us, provided that we do not resign ourselves to passivity but actively prepare for the future.'

That would be, he said, the dominant theme of the Cannes Congress, and the continuing doctrine of the World Energy Conference.

□

Low-energy listed building in Newent

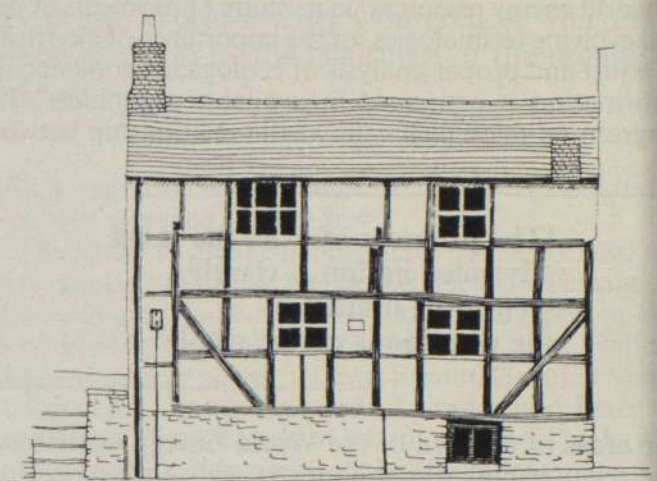
With architectural design by Neil Vesma and energy conservation engineering by Vilnis Vesma, a 17th century timbered house in Gloucestershire is being renovated and extended to 21st century standards. Vilnis Vesma describes what they have done

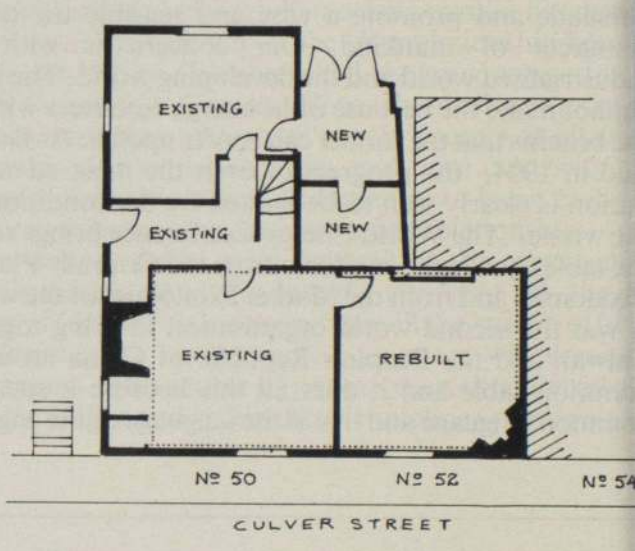
The construction and alteration of buildings in this country is, with the exception up to now of the inner London area, subject to Building Regulations which among other things lay down limits to the permissible average heat transfer rates through walls, roofs, and exposed floors: the U-values as they are known.

I have long thought these standards defective in that they do not seek to limit heat losses through floors in contact with the ground, nor from excessive ventilation or infiltration of unwanted air through the building fabric. Nor do they really succeed in defining what constitutes an acceptable standard of automatic control. The permissible U-values for walls are above what it is practicable and cost-effective to achieve; and it was a great disappointment when the 1985 revision of the Regulations was not used as an opportunity to bring some of these factors up to date.

On the credit side, the Department of the Environment did publish a useful little booklet Energy Efficient Renovation of Houses *this year, which hopefully will open the eyes of architects and the like to the cost-effective possibilities. Unfortunately, architects are not bound by useful little booklets to the same extent that they are by official regulations: they can and do, therefore, legitimately design new buildings and convert old buildings in a fashion arguably inadequate for today's needs, let alone the next century's.*

It need not be so. This article describes a house renovation and extension project in which every worthwhile energy saving opportunity has been taken — subject only to the increase in mortgage repayments being more than offset by savings in fuel costs.





By 1985, when the story begins, No 50 Culver Street in Newent (the left-hand portion of Fig 1) had been repaired and extended rearwards but its partner No 52 was still nothing more than a gutted, floorless, windowless shell with a mud patch at the back. It had a sound roof, shared with No 50, and its facade, although flimsy and leaky in the extreme, was eminently worth preserving from an aesthetic point of view. Otherwise, it was a mess: disfigured internally by rot, fire damage, and clumsy past attempts at rebuilding, and complicated by a total absence of perpendicularity.

The strategy for rebuilding was architecturally quite conventional: the reinstatement of floors, tied where possible to the existing structure or supported on new blockwork, and the lining of all walls with plasterboard on timber studwork in such a way as to create a ventilated cavity behind the existing single skin of the house.

A new rear extension was to be built between the corresponding parts of Nos 50 and 54; on one side it would be tied into the flank wall of No 50, and on the other side a new blockwork wall would be built up to first floor level. A lightweight first floor structure of timber studwork with a rendered plywood finish was proposed, partly because space was short and a finished wall thickness of 150 mm would be a distinct advantage.

These particular architectural solutions, which would have been adopted anyway, also happen to adapt readil to a 'low-energy' philosophy, as Fig 2 and the followin paragraphs illustrate.

Walls

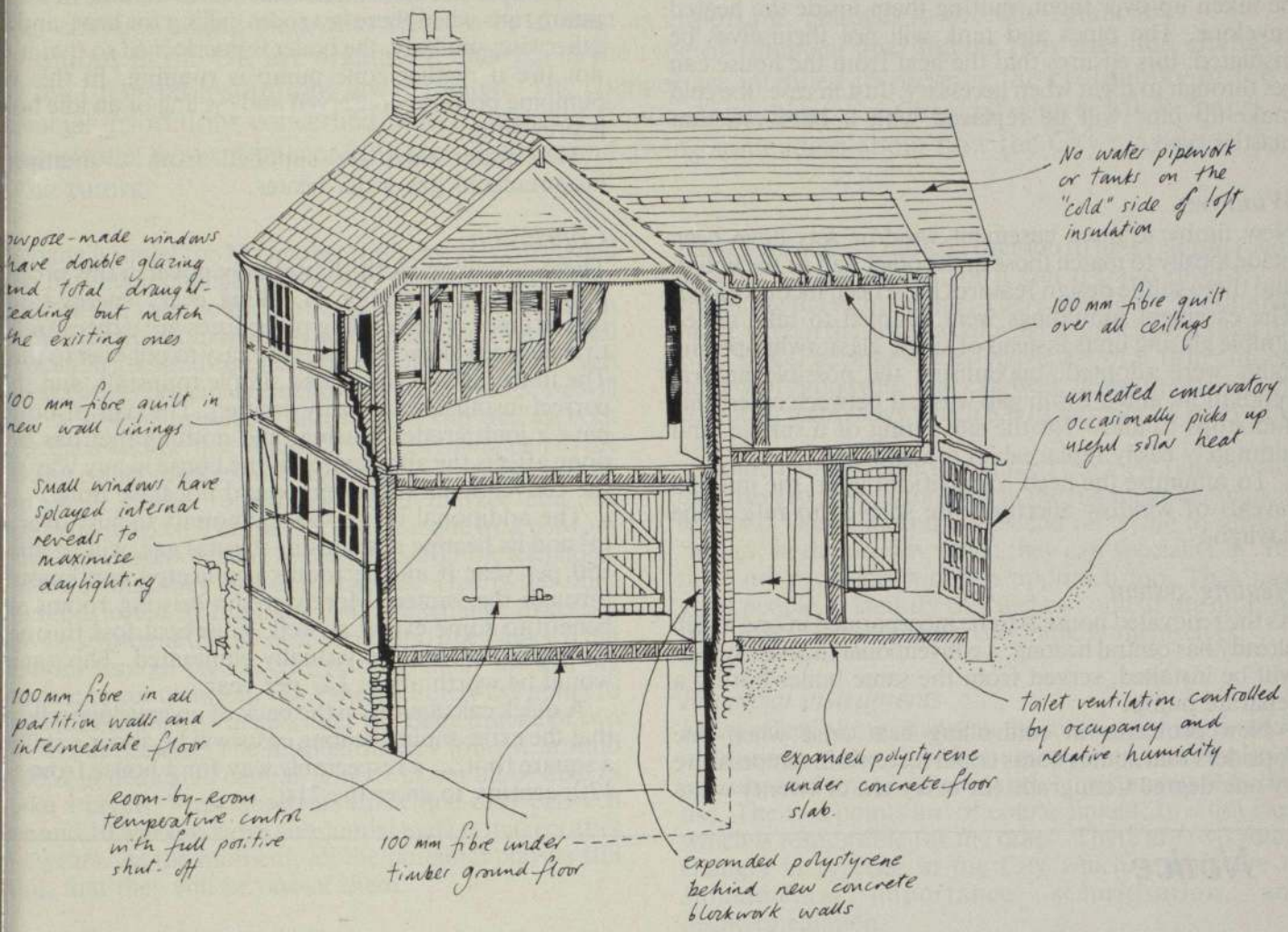
Outer walls in the old part of the house were being line with 100 mm deep timber studwork. Here the energy efficiency measure was easy to specify: full-depth roc fibre insulation instead of the 50 mm insulation that woul have satisfied the building inspectors.

This idea was extended to include party walls (also i need of lining) and new partition walls. In every case ther was a 100 mm deep void to be filled, and although ther is no requirement for insulation of internal walls, at a extra cost of under £2.00/m² it seemed worthwhil creating a 'cellular' structure in which every room can b kept warm (or cool) independently without interchang (and hence loss) of heat. There are other implications covered below under the discussion of intermediate floors

Upstairs in the new extension, the outer wa construction creates a 100 mm void to be filled like all th others. The difference lies in the fact that here there is n cavity to prevent external moisture coming through. Fou measures were employed to overcome this: (a) the use o building paper under the render; (b) the use o waterproofing additive in the render mix; (c) the use o

g 1 Front elevation and ground floor plan. The dotted line on the an indicates the original part of the house

Fig 2 Cut-away view illustrating energy conservation features



a water-repellent coating over the external paint; and (d) the use of Rockwool Rollbatt as the insulant, since it is treated with water repellent too. Note that none of these measures impede the passage of vapour through the structure, a crucial factor if interstitial condensation is to be minimised.

On the ground floor, the various bits of new blockwork wall, all of which back on to existing walls, have been insulated behind with expanded polystyrene slabs held in place with wire ties.

Floors

The new suspended timber ground floor has been built with a 390 mm spacing between joists, to take 400 mm-wide fibre quilt 100 mm thick. Plastic netting is stapled underneath to support the quilt until ceilings are installed.

Again, carrying on the idea of 'cellular' thermal design, the intermediate floor is similarly insulated.

The small area of concrete ground floor required for the rear extension was simply poured over 50 m of polystyrene slab.

Ceilings

All top floor ceilings are insulated with 100 mm of fibre quilt; this is the only measure that does not exceed the requirements of current regulations.

The reason for this is that the saving in fuel costs from adding further insulation is pretty well equal to the cost of borrowing the extra capital. It is more cost-effective by an order of magnitude to spend the extra money on an otherwise uninsulated element.

Moisture

Polythene sheeting is laid under timber floor decks and behind plaster-board wherever the space behind the corresponding insulation is outside the heated envelope, and ventilated cavities of at least 50 mm depth have been left between the new structure and the overall envelope. The cavity acts to disperse vapour percolating through or around the polythene, as well as isolating the internal structure from external moisture sources.

The polythene ensures air-tightness of the internal envelope; and permits an extremely high level of ventilation in the structural cavities without unacceptable infiltration to the heated space.

The attic space is highly ventilated, to prevent moisture which has escaped from the house from condensing on the toof timbers for long periods. This means that, to all intents and purposes, the attic space temperature will be equal to the prevailing outside air temperature and water pipes would therefore be at risk unless a more or less continuous draw-off could be guaranteed.

Low energy listed building (continued)

The house had no cold water static tank, so the only water services in the loft are the central heating feed-and-expansion tank, and its supply pipes. These are exceptionally vulnerable, especially the cold make-up pipe, which contains static water; so the ceiling insulation will be taken up over them, putting them inside the heated envelope. The pipes and tank will not themselves be insulated: this ensures that the heat from the house can get through to them when necessary. Just in case, the cold make-up pipe will be replaced with a burst-resistant plastics type.

Windows

New timber-framed casement window sets have been made locally to match those in the other half of the house, and three subtle design features have been incorporated. The casement mouldings were adapted to take sealed double glazing units instead of single glass; twin opening lights were adopted, maximising the possible natural ventilation; and a 2 mm gap was left between casements and stops to allow for the site fitting of a simple (and ultimately easily replaceable) draughtstrip.

To minimise the need for artificial light, the internal reveals of window apertures are splayed to reflect the daylight.

Heating system

As the renovated house is to be incorporated in one which already has central heating, a conventional radiator system will be installed, served from the same boiler but by a separate pump.

New problems in controlling heat arise when one considers that some rooms could increase in temperature by one degree Centigrade for every ten or twenty watts of heating — intended or accidental. The basic princip adopted are: (a) individual radiator valves which shut positively; (b) uninsulated heating pipes only permit to run through rooms if the flow in them stops when radiator shuts off; (c) selection of radiators of the small possible size to minimise the 'overshoot' caused by rele of stored heat after shut-off.

A simple electrical interlock ensures that the new zo pump runs when there is a room calling for heat, and i otherwise; similarly, the boiler is interlocked so that it not fire if neither zone pump is running. In this w pumping power is conserved and cycling of an idle boi is prevented.

Hot water taps are supplied from a multipo instantaneous gas water heater.

Conclusion

There is nothing earth-shatteringly novel in this proje it was simply a matter of taking every energy-savi opportunity. The building procedures are either famil to tradesmen already or else very easy to put over to the The materials are cheap and simple to install, and th correct installation is easily verified. The pair of hous have a joint grade II listing, and nothing that has be done affects the appearance of the house in any way th the conventional treatment would not have done.

The additional living space amounts to just over m^2 and its heating costs, using natural gas, will be abo £50 per year if all the rooms are heated continuous through the winter. Moreover the existing rooms w benefit to some extent as well, since heat loss throug the party wall will be virtually eliminated. This savi would be worth about £27 per year.

A quick calculation on the back of an envelope tells n that the extra annual heating costs will be about a shilli a square foot.... a respectable way for a house from t 17th century to enter the 21st.

Notice

Chernobyl: a technical appraisal

The British Nuclear Energy Society (of whom the Institute of Energy is a constituent body) is organising a technical seminar on 3 October 1986 on 'The Accident at Chernobyl'. This meeting will take place after information on the accident is expected to have been presented to the International Atomic Energy Agency, and will involve UK representatives who have attended these disclosure meetings.

It is intended to provide the opportunity for respected specialists in the technical areas concerned to present the facts as they are known, in a form which can be appreciated by anyone with a scientific or engineering background. The papers will be discussed by the British Nuclear Energy Society, together with a report of the discussion.

Details of venue, registration fee, direct from BNES (executive officer), tel: 01-630 0726

Change in the City of London*

Paul Richards†

Most of the publicity about change in the City is concerned with *Big Bang*. But there are a number of other changes taking place that seem to be at least as important: changes in the way financial institutions in the UK are organised; changes in the type of financial instruments they use; and changes in how financial institutions are regulated. The changes are intended to preserve the profitabilty of the financial institutions concerned, and to preserve London's position as a financial centre. Mr Richards concentrates here on interpreting the changes, and giving some ideas about how the City may develop in the future

Big bang is timed for 27 October this year. It is concerned with two main changes in the way the Stock Exchange is organised: the abolition of minimum commissions on Stock Exchange transactions; and the introduction of dual capacity in gilts and equities. Instead of a system in which jobbers act as principals and brokers act as agents, we will have a system in which participants can act as both principals and agents. What is expected to happen to the gilt and equity markets after Big Bang is what has already happened in the foreign exchange market and the eurobond market. The market will be made by a network of market makers dealing as principals over the telephone.

To do this, they will need capital. This is the third change affected by Big Bang. Stock Exchange firms can now be owned 100% by non-members, like banks. That includes foreign banks. The result is likely to be a big increase in competition. For example, there are going to be 28 market makers in gilts after Big Bang instead of two jobbers at present. The market makers will use around £700M in dedicated capital. They will not all be able to make a profit. Most observers think that only between five and 10 will survive as substantial market makers after five years. At the moment, all the potential players still think that they will be one of them.

Other financial institutions

There are also changes taking place in the way other financial institutions are organised which seem to me to be at least as important. The most important change is that barriers are breaking down between different kinds of business. For example, commercial banks have moved into merchant banking, on one side, and providing mortgages like building societies, on the other. Building societies want to provide unsecured consumer loans, on one side, and market life assurance and managed pension funds, on the other. Many of the merchant banks' functions involve underwriting risk — off the balance sheet — a little like insurance companies. It has been suggested that merchant banks gave up merchanting in the 19th century, and now they are giving up banking as well.

At any rate, we seem to be moving away from a world in which customers go to different financial institutions for different financial services — for loans, mortgages, insurance policies and the management of pension funds — and towards a world in which customers can get all these services from one institution. Which institution depends on how competitive they are. Will we need as many different institutions with branch offices in the high street in 10 years' time? I doubt it.

In building up its range of financial services, management has a difficult decision to make. It can follow a policy of acquisition, or it can try and diversify by recruiting the right people. There are plenty of examples in the City in the last year of what a difficult decision this is to make, because the effectiveness of a firm consists largely of 'goodwill' that can walk down the street, and computer technology which has to be replaced every three years.

Some management have taken the view that it is too expensive to try and compete in the full range of financial services. They concentrate instead on trying to identify 'niches' in the market which they can specialise in. But there are problems with this approach too. They need good people to identify the 'niches', and at the moment the 'niches' are changing very rapidly themselves.

Financial instruments

I have talked about change in the structure of the financial institutions in the City. I am now going to move on to talk about change in the financial instruments that they use. The two points are of course linked. It is not clear which is responsible for the other. There are two recent changes in practice in the City which I think are of fundamental importance: securitisation, and disintermediation.

The best definition of securitisation is 'making things marketable'. the point about a security is that the holder expects to be able to sell it at a known price before it matures: in contrast to a bank loan, which the holder expects to keep on his books, if necessary indefinitely.

The growth in the securities business in the City is partly due to the change in the financial climate, both in the UK and abroad. The decline in inflation had made bond markets more attractive over the past few years, and better company profits have made the equity market more attractive. The Government has also made a determined effort to spread the equity habit — for example through the privatisation programme.

But the growth in securities business is not only due to the improvement in the financial climate. It is also due to fierce competition and declining margins on traditional banking business. As margins are thin, banks buy assests to trade. They are often too expensive to hold.

Securitisation and disintermediation go closely together. Disintermediation means 'cutting out the banks'. Borrowers issue securities direct to investors instead of borrowing from banks. Investors buy the securities instead of placing deposits with banks. The banks' role is to provide liquidity by making a market in the securities, and sometimes to provide guarantees to borrowers that funds will be available from investors when the securities mature. The sterling commercial paper market, which has just opened in London, is a good example of disintermediation in practice.

*Address given to the Energy Industries Club at the Connaught Rooms, Great Queen St, London on 20 May 1986

†A director of Samuel Montagu and Company

The main reason for the growth in disintermediation is that many companies are now better credit risks than their bankers. This is partly due to the reduction in bank margins. It is undoubtedly also due to the Third World debt on the books of the banks. They cannot in every case afford to write it down to a sufficient level, but they are unlikely to be able to sell it without writing it down. Since some companies are better credit risks than their bankers, they can borrow more cheaply. So why use banks?

It is perhaps also worth mentioning that companies are not subject to the same degree of regulation — and regulatory costs — as banks. In other words, it is sometimes cheaper for a company treasurer to act as a bank than for a bank to do so.

Financial regulation

The changes in the City that I have talked about create all sorts of problems for the regulators. I will deal first with the problems arising from securitisation and disintermediation. I will then go on and deal with the problems arising from the breaking down of barriers between financial institutions.

Disintermediation creates monetary problems for the authorities, and prudential problems. I will not go into the monetary problems, except to say that most measures of the money supply are measures of different kinds of deposit with banks. The growth in the securities market bypasses the banks.

The prudential problems seem to me to be of two kinds. First, the growth in the securities market generates a trading mentality rather than a banking mentality. That is, because the holder thinks that he can always sell at a price, he tends not to look at the underlying credit risk, though it is still there.

Second, banks take on significant risks in the securities business that do not appear on their balance sheets. Just as banks traditionally only lend to people who do not need it, so the back-up facilities and guarantees that the banks provide for issues of securities are only likely to be called in the circumstances in which the banks are least able to provide them.

There are also problems for the regulators arising from the breaking down of barriers between financial institutions. I would like to mention three problems in particular. First, although there is general agreem about how financial institutions should be regulated that is, that there should as far as possible be s regulation backed by Statute — there is still considera confusion about who regulates whom. We have a Bank Act, which is due for revision, and we are going to ha a Financial Services Act. But financial conglomerates the future are likely to cut across all kinds of financ services: banking; mortgage lending; securities tradi insurance; and pension fund management.

The most immediate problem is that the Bank England supervise banking activities, while the Securit and Investors Board — and a number of satellit including the Stock Exchange and ISRO — will superv the securities industry. But banking and securities a increasingly alike. The Bank of England acts as lender last resort to the banking system to preserve pub confidence. Will it act as lender of last resort to t securities industry as well?

Second, the breaking down of barriers creates potent conflicts of interest. A single bank is likely to be able advise a company on taking over another company; trade in its shares; and to invest in the shares through t pension funds that it manages. Will Chinese walls sufficient to keep these activities apart?

Third, there is another potential problem relating insider dealing — fraud. It is difficult to believe that t new range of financial transactions and the increasi complexity of computer technology do not crea opportunities for fraud. Do the authorities have t resources to cope?

Conclusion

I have talked about change in the structure of financi institutions in the City; change in the type of financi instruments they use; and the problems these chang create for the regulators in the UK. I would like to en by saying that, although I have talked specifically abo the City of London, the changes are occurring to a great or lesser extent in the other major financial centres as wel The authorities have to meet the challenges that the represent, whatever the colour of the Government. □

The events at Chernobyl and their effect on world thinking

John L Bindon MInstE

On 26 April 1986 at 01.23 h, a major release of radioactivity occurred, following an explosion on the fourth unit of the Chernobyl nuclear power station. A very large nuclear plant, Chernobyl is situated some 80 km north of Kiev, the capital city of the Soviet state of the Ukraine.

The reactors at Chernobyl are of the channel-type light water cooled, graphite moderated type, termed RBMK. Four 1000 MW(e) reactors have been in operation there, the first one reaching its nominal full power in 1981.

It was not until three days later that the West came to the realisation that a major release of radioactivity had occurred somewhere in the USSR when high levels of radiation were measured in and around the site of the Forsmark nuclear power station in Sweden. Gradually over the following days details began to emerge that a large scale accident had occurred at the Chernobyl site.

At the time of the accident and for some days after the winds had blown the radioactive cloud northwesterly across parts of Finland and Sweden. That the release had come from the USSR was finally confirmed from exchanges between Swedish and Russian officials, the radioactivity consisting of high levels of iodine, caesium and cobalt.

Eventually, Mr Boris Shcherbina, deputy chairman of the USSR Council of Ministers announced that the accident at the reactor had killed two people and caused serious injury to nearly two hundred others.

As time went by other European countries including the UK began to record higher than normal levels of radioactivity, news which brought about much concern among many of the population. Such concern was expressed with a great deal of exaggerated fervour by the media even though the facts of the event were not established. Discrepancy in views of what the radiation levels meant to general health were also not uniform and anti-nuclearists were quick to call for a world ban of all nuclear power programmes.

It may be many months before the full facts of the accident are released due to Russian reluctance in such matters. This will not help advance the benefits which the use of nuclear energy will give to the world in general. That the Chernobyl event will play a part in the Sizewell PWR inquiry report seems to be of little doubt. With the voluminous report not expected until the autumn some reference is also certain to be made to possibly accidental releases of radioactivity, and what additional safeguards must be taken post-Chernobyl.

The USSR nuclear power programme began in 1954 when its first nuclear station was built and commissioned at Obininsk near Moscow. It laid claim to being the world's first nuclear power station, although its output was a mere 5 MW(e).

The design was a uranium-graphite moderated type with the fuel rods in channels, thus allowing a reloading regime to be attempted without the need of a reactor shut-down. The capacity of this design was first increased to 600 MW(e) at a Siberian nuclear plant, followed thereafter by the first two units at Beloyarsk in 1967 and 1969.

The development of this channel-type in the USSR was for the boiling water high power reactor system known as the RBMK-1000. Among the advantages which were seen at the time, apart from obtaining higher power ratios with increased flexibility by on-load refuelling, were reduced costs of manufacture through greater use of purpose built fabricating equipment at existing manufacturers. Lowly enriched fuel was used with high irradiation levels being achieved. The design featured multiple primary coolant circuits to decrease the probability of a serious loss-of-coolant accident.

The first two RBMK-1000 reactors were constructed and commissioned at a site near Leningrad in 1973 and 1975 before a series of such stations was embarked upon. There followed a major building programme when from 1973 to 1982, 10 RBMK-1000 reactors of a total capacity of some 10 000 MW(e) were put into operation in the USSR. These RBMK-1000 have been a major success story in the Russian nuclear power programme by producing about 65% of all electricity from nuclear plants in the country. Each station had returned good load factors, 75% being the norm.

The development of the RBMK type of reactor has included the construction of what would be the world's largest nuclear reactor, the twin reactor site at Ignalino with 3000 MW(e) capacity.

The nuclear power programme of the USSR has at present some 26 reactors commissioned, representing a gross electrical output of 17 370 MW. The other main Soviet design is known as the WWER type, substantially a pressurised light water moderated reactor. From the prototype built at Novo-Voronezh in 1964, 48 units remain in operation representing almost the remainder of the nuclear capacity although some operation has been achieved on fast breeder reactors.

The reactors at Chernobyl despite some Western claims to the contrary have been designed and built to high standards of safety. Obviously there is a wide disparity of views as to 'how safe is safe', but the USSR has a number of State Committees which through insistence upon nuclear power plant operators' compliance with statutory laws, regulations and standards in design, construction and operation, have attempted to insure against all types of accidents.

Safety Inspection bodies supervise the plants licensed while the USSR State Sanitary Inspectorate of the Ministry of Public Health supervises the compliance with rules governing radiation safety. In connection with this topic, radiation safety standards have been formalised on the recommendations made by the International Commission on Radiological Safety (ICRP).

As a means of furthering development and expansion of nuclear energy, the Soviet Union has cooperated closely with a number of countries of the Eastern bloc including Yugoslavia. It is of course a matter of regret that such collaboration has not hitherto extended to other countries with nuclear power plants, other than the very occasional presence at nuclear meetings and conferences. Certainly in the UK there has been little input at such events from the Soviet Union.

Intense speculation has been voiced over a number of matters since the Chernobyl disaster including comparisons between the probability of the risk of a

similar event in Britain. The fact that the RBMK reactor uses graphite, and it must be correctly assumed that some ignition took place, has brought such comparisons closer with gas cooled graphite moderated reactors.

The differences, however, in the two systems are so wide as to make such comparisons innocuous. For example, the pressure vessel in the Chernobyl reactor was designed to withstand only about 60 psi, whereas both steel and concrete pressure vessels of the UK reactor units are designed to very much higher levels altogether.

One special topic where a considerable amount of re-thinking will be needed is on the question of the safety to the population of off-site releases. In the UK, emergency plans exist at all nuclear establishments and exercises involving both station personnel and off-site services such as Police, Fire, Ambulance, etc take place annually at such establishments. Various scenarios are acted upon, witnessed and examined for performance by the Nuclear Installations Inspectorate (NII).

Nuclear power stations in the UK have been located in areas of very low population density where the question of evacuation within an 8 km radius would not prove a particularly difficult exercise to accomplish.

However, the disaster at Chernobyl places upon nuclear authorities in Britain an urgent need to seek solutions to what could amount to a population evacuation of an order of magnitude many times greater.

Taking the Chernobyl case, about 48 000 people were evacuated within a 30 km radius, the evacuation commencing within 36 hours of the accident. In addition, as a preventive measure potassium iodide tablets were issued to all of those people plus additional numbers of the population outside the area. The evacuation apparently took place in an orderly fashion and without panic.

Although it is known that the chain reaction was stopped automatically at the time of the accident, the explosion caused a fire which seriously complicated preventive work by station personnel. Neither water nor chemicals were used in the fire fighting because of the fear that their use might lead to further explosions. The whole reactor suffered fire in parts of the graphite and considerable effort was needed to get the situation under control. Aerial bombardment of upwards of 5000 tons of sand, clay, limestone, dolomite and boron were dropped by some hundreds of helicopter runs by volunteer pilots on the exposed top face of the reactor.

Early reports indicated that the highest level of radiation recorded at the 30 km zone was 100-150 μSv per hour. Even in Kiev, from which a large number of medical teams were amassed to deal with the injured and those suffering from high radiation burns and exposure, the radiation levels never presented a health hazard.

Over 200 people, mainly station personnel were seriously affected by radiation and following the initial two fatalities, six people died some two weeks later. At that time a further 35 were still critically ill.

Despite some ill-informed western newspaper reports, the USSR placed considerable expertise in nuclear technology and medicine at the disposal of the Chernobyl authorities. This was later enhanced by a specialist medical team from the USA.

A tight control was placed upon agricultural products, the concentration of iodine in milk being especially tightly controlled, as with vegetables entering Kiev. In addition water supplies were closely monitored, the River Dnieper, the pride of Kievans, showing no increase in radiation above normal. Purely as a precautionary measure, evacuation was later extended to children in Kiev.

Dr Hans Blix (director) and Prof Morris Rosen of the IAEA were invited to Moscow for talks on the accident and later met Mr Gorbachev. At a Press Conference giv following a flight over the Chernobyl site, they said th had succeeded in forming a full report of the event a its consequences as was known at that time and they w fully satisfied that all the necessary measures for protecti the health of the population had been taken. The cha reaction had ceased at the time of the accident.

A very important step had been taken by Dr Blix's vis in which Soviet nuclear engineers would be cooperati to the fullest extent with IAEA experts. Both Dr Blix a Prof Rosen visited Kiev and described the city as norm They both reiterated that a large part of the radioacti release was from the emission of short lived radionuclid a large fraction being iodine 131. As a result damage agriculture would not be as great as was at first feare

The effect of the accident on farming produce neighbouring countries including the EEC had led to belief that measures were needed to restrict imports. Su harsh regulations were in the end not thought to be need following advice from radiation experts of the WH (World Health Organisation).

The director-general of WHO convened a study grou to analyse the effects of the accident on health. The experts looking at Europe overall agreed that precautio that had been taken by some countries in the early da of the accident were no longer required.

In Britain the Ministry of Agriculture, Fisheries a Food (MAFF) in conjunction with the Nation Radiological Protection Board issued some precautiona instructions for specialised groups. For example, it w not until some eight weeks after the event that t movement and the sale of lamb was banned in Nor Wales and Cumbria.

The decision was taken from the results of son hundred or so measurements of total caesium intake lambs. The half life of Cs 137 is roughly 30 years, but t residence of this radioactive nuclide in lambs is large relation to body weight. The ban was very controversi in the farming community who have turned to t Government for financial aid. The price of lamb whi was already at the market dropped drastically by son 30%, and even at that low price lamb in general remain unsold in many British shops. All in all the losers in Brita from the Chernobyl accident were the farmers of Nor Wales and Cumbria.

The events at Chernobyl have affected world thinkin on the future of nuclear technology including many pr nuclear specialists. This is obviously understandabl because of the effect of the radioactive cloud showin itself not to be restricted to national boundaries. Both Ea and West will re-examine their own systems, after all th Soviets had been convinced that the RBMK-1000 reacto was a safe system.

□

Note: Since the above was written it was reported on 22 Augu that the Chernobyl disaster need never have happened and w blamed on staff turning off an emergency cooling syste during tests. In next month's 'Books' pages we review t recently published 'The worst accident in the world, Chernob — the end of the nuclear dream' — see also notice of BNE meeting, p 10 this issue

Energy managers Powrmatic/NIFES award

This year's regional winners in the Powrmatic/NIFES National Energy Management Awards competition have been selected. The following entrants will now be shortlisted for the final and therefore become the candidates for the 1986 National Energy Management Award.

Among the winners was P G Green, Shropshire County Council, who is a Member of the Institute of Energy. Other winners are: D F Smith, West Sussex County Council (South-East Region); Norris Twaite, British Sugar, Peterborough (Eastern); David Diggle, John Heathcoat & Co, Tiverton (South-West); R N Goodchild, H J Enthoven & Sons, Matlock (East Midlands); A Skelton, A C Skelton & Sons, Hull (Yorkshire and Humberside); Mr Kemp, Cummins Engine Co, Darlington (North-East); J Briggs, Michelin Tyre, Ballymena (N Ireland); Mr Fletcher, Kay & Co Ltd, Bolton (North-West). No outright winners were selected for Scotland and Wales.

'The competition this year was very fierce in some regions, with the standard of entries among the highest we have seen,' said Dr Elliot Finer, director for industry and commerce, Energy Efficiency Office. 'It was very encouraging to receive such an enthusiastic response from the country's energy managers in Energy Efficiency Year.'

'One entry attracted our particular interest because of its imaginative and innovative approach. So the sponsors kindly agreed that this year we could make an additional award — a special award for innovation.'

The recipient of this additional award is P R Charnley of North Level Internal Drainage Board, Peterborough, representing the Eastern Region.

The regional winners will be presented with a cheque for £50, a specially engraved gold pen and an award certificate. The winner of the special commendation receives a gold pen and a certificate commemorating his energy management programme.

This year's winner of the National Award, who will receive his prize at the National Energy Management Exhibition and Conference Dinner on December 3, will win the Powrmatic/NIFES Trophy, a cheque for £1000 and, to commemorate Monergy '86, an additional prize of a continental holiday to the value of £1000.

Source: NIFES

Royal Society Expanding the PSU

Last summer the Royal Society announced the establishment of the Policy Studies Unit. Its general objective was to improve the level of quantitative and semiquantitative information available to those responsible for advising on, and making, science policy in the UK. Several mechanisms were envisaged for this, including the carrying out of major studies (either of the Society's own choosing or under contract to outside bodies), assisting in policy studies carried out elsewhere within the Society and creating a suitable database.

Many important science policy issues also embrace questions of technology and engineering. Accordingly, studies of these policy issues are best extended into fields in which the Fellowship of Engineering has a special interest and expertise. With that in mind, *Royal Society News* reported that the Society recently agreed, with the Fellowship, to expand the Unit's range of activities to include areas of direct interest to the latter and agreed that the Unit become sponsored jointly by the Society and the Fellowship. This change in its status is reflected in its new name, the Science and Engineering Policy Studies Unit (SEPSU).

SEPSU, like the Policy Studies Unit, will be funded from private sources, enabling it to tackle with demonstrable independence any issue it chooses. Funding is being sought to allow the Unit to expand to at least 10 staff (including five on professional grades); over half the funds necessary for this level of operation have already been generously made available.

The Unit is overseen by a steering group headed by a chairman from the Royal Society (currently Sir David Smith sec R S) and a vice-chairman from the Fellowship of Engineering (currently Sir Kenneth Corfield FEng). In addition the Steering Group comprises four members from the Society, three from the Fellowship and up to three jointly from the Society and Fellowship. The staff of the Unit is based at the Royal Society and headed by Dr P M D Collins.

SEPSU will follow the general *modus operandi* of the Policy Studies Unit. The main studies undertaken by the Policy Studies Unit have been a quantitative evaluation of the relative health of basic science in the UK (to be published shortly by the Advisory Board for the Research Councils, which commissioned the study), and a survey of the migration of scientists into and out of the UK. In addition to completing the latter, SEPSU is exploring in detail the scope for studies relating to such general policy issues as the trends in costs of undertaking research, comparisons of different types of research organisation, measurements of 'value for money', and international collaboration in research. The Unit is also developing a database of policy-relevant information.

It is intended that SEPSU shall develop into a national centre of expertise in science and engineering policy, working alongside other policy groups; drawing on the insights of the academic science studies community and generally strengthening the effectiveness of both the Royal Society and the Fellowship of Engineering in their contributions to the formulation of national science and engineering policy.

Source: Royal Society News

UK energy digest Increase in demand

The 1986 *Digest of United Kingdom energy statistics* has been published by the Department of Energy. The main points are as follows:

Fuel production

Primary fuel production in Britain last year, equivalent to 398.1 Mt of coal, was 16% more than in 1984, mainly due to the effects of the coal mining dispute in 1984 and early 1985. Coal production, at 94.0 Mt was 83.6 % more than in 1984. Crude oil production amounted to 127.5 Mt, whilst natural gas production was 15.8 b therms. North Sea oil and gas amounted to over 70% of total primary fuel production.

Total use of fuels

Demand for energy in the UK last year, equivalent to 326.9 Mt of coal, was 17.9 % less than primary production. Demand was 4.7% higher than in the previous year (3.3% after correction for temperature differences — 1985 was below average). Nevertheless it was still 8.1% lower than in 1979, the year of peak total consumption. When non-energy uses of fuels are included the net surplus of production was nearly 17%. 1984 was not a typical year because of the effects of the dispute in the coal mining industry, and the considerable distortion to patterns of supply and demand. The dispute, although ending in March 1985, continued to affect those supply and demand patterns during the rest of that year.

Consumption of individual fuels

Coal consumption in 1985 rose substantially, to 105.3 Mt, and accounted for 32% of primary energy consumption. Inland demand for petroleum fell to 67.7 Mt and accounted for 35% of primary energy. Natural gas consumption rose by over 7% and accounted for 20.6 b therms. Use of nuclear electricity increased by 13% and hydro-electricity by 2%. Natural gas provided just over 25% of primary energy consumption, nuclear electricity 6% and hydro-electricity 0.6%.

Final consumption of energy

Energy use by final consumers rose by over 4% in 1985, to 56.3 b therms. The smallest increase, less than 1%, was in

industry other than iron and steel. This sector used just under one quarter of all final energy in the UK. Consumption in the iron and steel industry, representing 5.4% of total final consumption, was 3.9% up on 1984. Energy consumption in the domestic sector, which accounted for 29.6% of the total, was up by 11%, influenced by the relatively low average temperature in 1985. The transport sector's energy use increased by just under 2%, and its share of total final consumption was virtually unchanged, at 27%.

Imports and exports of fuels
The value of exports of fuels in 1985 exceeded that of imports by over £6 b compared with £5 b in 1984 (Overseas Trade Statistics basis). Crude oil exports amounted to 79 Mt, worth almost £13 b (exceeding imports by 53 Mt, or over £8.5 b). Imports of petroleum products fell followng the end of the coal dispute leaving the total for the year 13% down on 1984. Exports rose by almost 16% (OTS basis). The deficit (value of imports less exports) fell by almost £1 b to £0.4 b in 1985. Coal exports rose from 2.8 Mt in 1984 to 3.8 Mt in last year, and imports rose from 11 Mt to 13.1 Mt. Imports of natural gas, which fell very slightly, accounted for about a quarter of the gas used in the UK.

Spending on energy
41% of total spending on energy by final consumers in 1985 went on fuel used for transport. 27% was spent on energy in the home and 18% by industry. Public services and miscellaneous users accounted for 13% and agriculture 1%.
Source: Department of Energy

Sizewell B
'Unlikely to be built'

The proposed Sizewell B nuclear power station in Suffolk is unlikely to be built and there is no early prospect of orders for coal-fired stations, says a report on the outlook for power plant suppliers, the *Financial Times* reported.

The study† warns that UK generating-equipment makers 'will progressively run out of work over the next few years and there is little prospect of recovery for several years at least after that.'

Mr Nick Cunningham, its author, echoes the conclusions of a recent report to the National Economic Development Council which forecast further contraction of the industry and the risk that when orders did revive equipment would have to be imported because of lack of UK capacity to supply it.

Sizewell, says Mr Cunningham, will be deferred until after the next election and is unlikely to get the go-ahead even then.

In spite of reports that the Central Electricity Generating Board is considering two large coal-fired stations in southern England, he believes that no alternative to Sizewell would be built for at least five years.

The most likely outcome, he says, is a continuation or stepping up of the refurbishing of coal plant, as in the US. But this would not provide enough work to maintain the UK manufacturers at their current size.

Further refurbishment of coal stations would also be attractive for the Government because of the low cost of fuel, says Mr Cunningham.
Source: Financial Times

**The Digest of United Kingdom energy statistics* can be obtained from HMSO at a cost of £13.00

†Study by Laing and Cruickshank, stockbrokers

Efficient lighting
European study

Much of the energy now used to light office buildings could be saved, according to a new report published by the European Community's Directorate General for Energy in Brussels. The report explains how savings of up to 73% can be achieved without any loss of comfort or working efficiency, and some of the energy-saving measures can be repaid in as little as two years. The best and most popular way to economise is to use individual desk lighting with background lighting controlled automatically by outside daylight levels.

But installation of new lighting systems, especially those that are controlled automatically by the level of daylight, should never go ahead before there had been full consultation with the office staff involved, the report warns. Also, the systems must be capable of accommodating future changes in office layout and use.

These findings come from an energy-saving demonstration project in a typical office building in Groningen, the Netherlands, sponsored by the European Community and supported by 15 Dutch companies. The seven-storey building is mostly divided into relatively small office rooms, 30 per floor, arranged either side of a central corridor. Five different energy-saving lighting systems and a variety of control systems were installed on five floors of the building. The energy consumed on each floor was measured over one year. The energy consumed on a sixth floor with unmodified lighting was also measured as a reference. Staff reactions were also monitored.

Two of the new lighting systems, installed on two floors, used general lighting similar to the existing lighting in the building, but with lower-powered lamps and better-located lighting fixtures. The two systems were controlled automatically by daylight levels, with two settings: one for outer offices receiving plenty of daylight, the other for inner, darker offices.

A third floor had individual light fittings suspended over each desk with only the lighting of the outer offices being switched on automatically by daylight levels. The lighting of the inner offices was controlled by the office users. The fourth floor had high-efficiency lighting fixtures on the ceiling plus table lamps a work stations. Only the main fixture were controlled by daylight levels, agair with two different settings for inner anc outer offices. On the fifth floor suspended fluorescent lamps provide work-station lighting as well as indirec background illumination.

Infra-red detectors capable of sensing the presence of staff were installed tc control lighting in two working areas or the fourth floor. Lights were automatically switched off after the occupant had left the room for more thar five minutes, and switched on agair whenever someone re-entered the office

The results of the project showed that individual lighting of work stations not only provides the greatest energy savings but is also the most popular energy-saving method with staff. It avoids having tc make modifications to allow lighting fixtures suspended above desks to be repositioned when office furniture or partitions are moved about. Even without automatic control by daylight levels, individual work-station lighting plus background lighting was found to produce significant savings.

In general, the regulated lighting systems reduced energy consumption by between 30 and 40% of the maximum number of 'burning hours', the difference being largely accounted for by different levels of use and occupancy on the different floors. Overall, it was clear that energy-savings of at least 30% could be made by daylight-level controls combined with some form of dimming.

It was also concluded that more research is needed on methods of installing automatic controls. The strongest complaint in the experiment came from some office staff who claimed their lights were switched off while it was still too dark. Lighting controls worked best when the light-level sensors were mounted in a naturally-illuminated scale model of the building, rather than on parts of the actual building such as the window sills.

The report emphasises the need to consult and inform staff about the installation of energy-saving lighting systems. This particularly applies to the introduction of daylight-dependent lighting control systems over which staff have no direct control.
Source: EIBIS

Nuclear waste
Promises of action

Britain's nuclear industry, in the face of severe criticism by MPs, has promised to try to overcome public unease by adopting more professional solutions to the disposal of low-level nuclear waste the *Financial Times* reported.

The industry saw this as the only way to create a public mood which would let it approach the disposal of long-lived nuclear waste.

The statement came on Friday in the industry's final response to the House of Commons Environment Committee which last March called Britain's

management of nuclear waste amateurish and haphazard, and demanded strict new controls on radiation discharges.

The MPs' report said discharges from the Sellafield reprocessing plant in Cumbria had turned the Irish Sea into the most radioactive body of water in the world.

The industry's reply was made on behalf of the electricity generating boards in England and Scotland, British Nuclear Fuels, the UK Atomic Energy Authority and the Nuclear Industry Radioactive Waste Executive.

The response, which followed interim comments on aspects of the report, made it clear that the industry wished to dispose of low-level waste as soon as possible rather than storing it.

It intended to narrow the choice of four potential waste disposal sites to one and, following a full public inquiry, to 'get on with the job.'

'In our opinion the disposal of nuclear waste does not pose any difficult technical problems and we therefore believe that the question of timescale for disposal of this material is almost entirely one of public perception, political judgment and political will,' it said.

On discharges from nuclear plants, the industry claimed that 'significant reductions' had been achieved at Sellafield.

Source: Financial Times

Nuclear waste disposal NIREX appoints consultants

Consultants have been apointed by the Generation Development and Construction Division (GDCD) of the CEGB, on behalf of UK Nirex, to conduct investigations into the civil engineering aspects of the four sites named by Nirex on 25 February 1986 for assessment as a possible disposal facility for low level radioactive waste.

The investigations are to provide information to enable the suitability of the sites to be assessed for the construction of a disposal facility. One new facility is needed.

The appointments cover the design, supervision and interpretation of geological and hydrogeological investigations, collection of information on all aspects of the sites and preparation of reports incorporating details of the work undertaken by the consultants and studies undertaken by others appointed by Nirex and GDCD. These reports will include a detailed assessment as to the engineering suitability of the sites and are due for submission in preliminary form in 1987.

The investigations are due to provide a systematic geological characterisation of the sites and will include boreholes to depths of up to 350 m. The boreholes will be tested to determine the permeability and other characteristics of the strata and will be equipped with a wide range of instruments for the long term monitoring of groundwater conditions.

Geophysical surveys for the surface and in completed boreholes will be carried out together with a detailed programme of *in situ* and laboratory testing. Exploratory excavations will be used to investigate the near surface strata and to detect the presence of features such as faults which may have affected the sites.

Source: NIREX

IEA natural gas study New fields need developing

A new study* of the outlook for natural gas in International Energy Agency (IEA) countries over the next 25 years underscores the need for continued development of new gas fields within the countries themselves, the IEA's executive director, Mrs Helga Steeg, said in releasing the review.

'Natural gas prospects shows that IEA countries will need gas supplies from these new, indigenous fields to supplement declining production from older fields and to meet a projected increase in demand.' Mrs Steeg went on, 'The study also highlights the continuing importance that the IEA places on secure gas supplies from diverse sources'.

The study assesses gas supply and demand trends in the OECD's three regions — Western Europe, North America and the Pacific countries to the year 2010. It was prepared by the IEA secretariat in co-operation with gas and energy experts from member countries.

In Europe, the study says, the gas supply picture is dominated by long-term contracts, some of which run into the next century. Western Europe may obtain future supplies from its traditional sources, the Netherlands, Norway, Algeria and the Soviet Union, from new suppliers in West Africa or the Middle East, or from as yet undiscovered fields.

In a section dealing with the North Sea, the study says the current discussions on a sales agreement covering natural gas supplies from the Troll field and other gas fields in Norway are particularly significant for the future gas supply of Europe.

In its assessment of the North American regional gas picture, the study expresses concern about future supply in the large United States market by the 1990s, despite the over-supply, or so-called 'gas bubble' which currently exists. The study welcomes the move to a freer and more competitive gas market in both the US and Canada, but acknowledges that increased competition may lead to somewhat greater uncertainty as to future supply and demand.

In the Pacific region, gas supplies for Japan 'look reasonably well assured into the 1990s', the study says. Japanese gas use has increased sharply in the last decade as a result of a number of liquefied natural gas projects coming on-stream, primarily for supplying the country's electric utilities. Australia and New Zealind have been developing their domestic gas reserves.

For the next few years, oil prices should not significantly influence the level of gas supplies, the study says, but 'a prolonged period of relatively low oil prices carries the risk of reducing the exploration and development activity which is necessary to increase and in some areas even to maintain supplies of gas'. This might result in increased reliance on oil, which could lead to tighter markets by the 1990s.

The study works with the assumption that the OECD countries' demand for gas will grow at a rate of slightly lower than that for total energy over the 25 year review period. In 1984, OECD gas demand was 806 billion m^3. By 2010, depending on what happens to overall energy demand and oil prices, gas demand could be from 10 to 25% higher than today's levels, the study says. However, the trends vary greatly among countries and regions.

Source: IEA

*Copies of the gas study can be obtained from the IEA Public Information Office, telephone (Paris) 45.24.94.58 and 45.24.98.92

World Bank Privatise power generation

Gabriel Roth, president of the Services Group, an American group of consultants specialising in the practice and concepts of alternative service delivery, believes that to ensure efficiency and reduce costs the generation of power should be left to the private sector.

'Cheap credit squeezes out private finance,' said Mr Roth, in a clear reference to World Bank lending. 'The low development countries are given finance to build power stations because private finance is not available on terms they can afford.' It was not the intention, he explained, that the public should buy power at uneconomic rates. The public should pay the true cost of production. It was uneconomic for them to pay a reduced rate based on the reduced cost of the capital finance.

Mr Roth was addressing a meeting of members of the Energy Group of the British Consultants Bureau (BCB) at their Westminster Offices.

Mr Roth, who is the author of a book entitled *Private provision of public services in developing countries* which is to be published by the World Bank this year, made a clear distinction between generation, transmission and distribution of power. He pointed out that distribution, to be economic, must be a monopoly and that it was generally uneconomic to provide alternative transmission. In the case of power generation the position was different. There was no reason why power should not be generated by the private sector, with the distributor shopping around for the cheapest supply.

Mr Roth believed that the role of government should be to encourage the production of power by the private sector, especially in the low development

countries where current supply did not meet demand. Regulations should only be for safety.

The World Bank, according to Mr Roth, was very concerned about the low efficiency of power generation and the waste of power produced in many countries, and would welcome the competition which would result from private generation.

'The role of consultants,' said Mr Roth, 'is to respond to the needs of clients and advise them on the economics of private generation'. He recognised that many governments were opposed to private generation, but believed they were unaware of the wastage inherent in the public system.

Asked whether the World Bank was in a position to provide the private sector with finance for power generation, Mr Roth said that it could be financed by the International Finance Corporation at commercial rates and on terms which gave protection against political, but not commercial risks.

Source: British Consultants Bureau

Energy conservation
Award for school

Savings in fuel bills of more than a third have won a top energy conservation award for the Shakespeare School at Eastleigh in Hampshire.

The £325 000 project involved upgrading the existing 1970's school buildings, together with the construction of a highly energy conscious new classroom block. Calculations indicate that savings of 34% have been obtained, worth more than £2200/y.

The reduction in energy use in the original building has been achieved by improving the insulation levels in the roof and wall panels, providing a glazed roof over a courtyard to accommodate a new library area, and the installation of new boilers, improved heating controls and highly energy efficient radiant ceiling panels.

The new classroom building includes very high levels of insulation throughout, double glazed windows and low energy uplighters. The boiler installation and heating controls also contribute to the energy savings.

An eye-catching design feature is the new barrel vaulted glazed area that links the original building with the new classroom block. This has become a popular space in the school and is used to house an exotic range of tropical butterflies and plants. It also contributes to heating the school through passive solar gains.

The school has demonstrated that sensible, cost effective measures can reduce the fuel bills while at the same time providing a more pleasant internal environment.

The award was made to the school by the Energy Group, a body formed during the current Energy Efficiency Year with representatives from the Department of Energy, the various fuel industries and the Chartered Institution of Building Services Engineers, Royal Institute of British Architects and the Royal Institution of Chartered Surveyors. A certificate and a cheque for £200 was presented to the design team last week.

Source: ECD Partnership

Enterprise
More money for jobs

Peter Walker, Secretary of State for Energy, has announced that the Government has doubled the funds available to British Coal's enterprise company whose task is to help create new jobs in mining areas. The company, which will now be known as British Coal Enterprise, now has access to £40 M.

In a Parliamentary reply to Alan Howarth MP, Mr Walker said, 'NCB (Enterprise) was set up on October 8, 1984, with initial funding of £5 M to support and encourage new and expanding industries to create lasting jobs in Britain's traditional coal-mining areas. On November 28, 1984, this sum was doubled to £10 M. The company's continued progress resulted in a further doubling of accountable funds to £20 M on July 25, 1985.

'The company is continuing to make excellent progress and is increasing the scale of its success: up to the end of June the company had committed £12.9 M towards 639 projects to create 8228 job opportunities. A further £65 M of investment has been attracted from other sources and, in addition, the company will be spending some £3 M on building works for new enterprises and businesses.

'The compnay aims to double the level of its activities during this financial year. This will result in much more money being needed over the coming months. I am therefore delighted to announce that a further £20 M is being made available, bringing the total funding available to the company to £40 M'.

Source: Department of Energy

Oil-to-coal
Canadian conversion

A Can $25 M contract had beeen awarded by the Nova Scotia Power Corporation (NSPC) to convert an existing 150 MW oil-fired boiler at the utility's Point Tupper, Nova Scotia station to pulverised coal.*

Upon completion of the project in 1987, the unit will produce the same amount of steam per hour burning coal as it did when it burned oil. The steam is used to turn turbines, producing electricity.

According to NSPC, the conversion of the unit will reduce its overall consumption of oil, providing a net saving to NSPC over the life of the unit in excess of $100 M.

Burning coal instead of oil to produce steam usually requires a much larger combustion chamber, which means a unit converted from oil to coal can no longer produce as much steam. The design for this conversion maintains the original steam output by rebuilding the entire boiler within the old boiler's structural steel.

The Nova Scotia project is an example of how the 'back to coal' trend is affecting energy requirements throughout the industrial world. The market in Europe for oil-to-coal conversion is developing progressively.

Source: Press release

*Awarded to Combustion Engineering

China
Major oilfield

The discovery of what is described as a major oilfield in the Central Henan province of China was announced by the New China News Agency in July, the *Financial Times* reported.

The agency said that the field had reserves of 292.6M barrels of heavy oil in a 16.2 km^2 area, although reserves might be as much as 700M barrels.

The agency said that the oil is in shallow strata and is easy to exploit. However, Western oil industry experts have said that it was difficult to judge the significance of the find because the details reported were scanty and the province not open to the West.

Much depnds on how heavy the oil was and whether it could be recovered without expensive 'tertiary' methods like heating up the oil to enable it to be removed from the reservoir.

Source: Financial Times

India
New oil fund

India's first major discovery of oil in the south has been made in the promising Krishna-Godavari Basin and there are signs that the oilfields could be commercial, K K Sharma reported in the *Financial Times* recently. Until now, traces have been found only of gas in the tract.

The discovery was announced in parliament in August by Mr N D Tewari, Minister for Petroleum and Natural Gas, who said that oil had been found in the third exploratory well in the Kaikalur structure 60 km east of Vijayawada in Andhra State.

At present, the well is yielding light oil at the rate of 220 barrels a day.

Source: Financial Times

Wind power...
...in the Caribbean

A pilot wind power project undertaken by British Electricity International in Barbados has completed commissioning tests, and has begun feeding power into the island's electricity network.

The 200 kW wind turbine generator, which has been installed on a hill top site at St Lucy in the north of Barbados, is the largest wind turbine in the Caribbean

at over 25 m high and with a three-bladed, 26 m diameter rotor. It will generate electricity at wind speeds over 6 m/s.

The £400 000 contract to manage the project was awarded by the Government of Barbados in May 1984. It was funded by the Inter-American Development Bank.

The main aim of the project was to evaluate the performance of the generator to assess whether a full scale wind farm using larger turbines would be feasible.
Source: BEI

EPRI contract
Worth a total of $25 M

The Electric Power Research Institute (EPRI) of New York has awarded the first phase of a $5M research and development contract to develop coal-fired steam generator equipment designs intended to increase power plant efficiency.*

The contract is part of a 5-year £25 M research and development project which has been divided into three parts: turbines, boilers and balance of plant.

This portion of the project involves studying high efficiency boiler designs for 316.38 kg/cm² (4500 psi), 615° C and 643°C double reheat units. The boilers will be fuelled by pulverised coal and capable of cycling service, including sliding pressure and low load operation.

Two 700 MW steam generators with vertical furnace wall tubes will be designed. One steam generator design will have an outlet steam temperature of 615°C, while the other will have an outlet steam temperature of 643°C. Two 350 MW steam generators with spiral furnace wall tubes will also be designed.

In addition to the base design fuel three significantly different coals will be evaluated for their effect on these boiler designs. The maintenance requirements for the new designs will be estimated, based on existing data and extensive new field and laboratory tests included in this project. Test programmes to develop and verify new stainless steel alloys for boiler pressure parts are also included.
Source: Press release

*The contract was awarded to Combustion Engineering, Sulzer Brothers and Mitsubishi Heavy Industries.

Catalysis
New hydrotreating test unit

A new test unit has been installed in Pasadena, Texas.† Capable of testing all types of petroleum feedstocks, the new unit is especially suited to testing vacuum tower bottoms. Special features have been incorporated to handle bottom of the barrel cuts and to operate in either the upflow or downflow modes.

The new four-reactor isothermal hydrotreater will allow researchers to simultaneously evaluate four different catalysts, four different feedstocks, or four different operating conditions. Pressure, gas flow rates, and LHSV can be studied at two isothermal temperatures, while incorporating inter-reactor sampling capability.

Designed as separate reactor trains sharing two common fluidised sand-bath furnaces, the unit can be operated in series or in parallel configuration. Because of this and various other design features, this system provides exceptional flexibility for concurrent testing. The same catalyst, for example, can be subjected in all four reactors to a wide range of process conditions, with kinetic constants obtained in a relatively short test.

In addition, the system allows comparison screening of different feeds at a common temperature. Its flexibility is such that an ageing test can be conducted in one furnace and short screening tests in the other furnace.

The microprocessor-controlled test unit, representing state-of-the-art technology, is also capable of operating at very low space velocities. Design temperature is 510°C and design pressure is 3500 psig (240 bars).
Source: Press release

†Akzo Chemie America

INDUSTRY YEAR *1986*

More technicians needed

The Engineering Industry Training Board is examining ways of upgrading the skills of technicians to help overcome shortages of professional engineers reported the *Financial Times* in June.

Shortages of engineers, particularly in the information technology and advanced electronics areas, are regarded as a serious constraint at present and in the future on the progress of the engineering industry.

Senior training board officials believe the upgrading of technicians is one of the most important and a relatively speedy way of helping overcome the shortage. It is accepted that in the longer term, more professional engineers must be provided by the universities and polytechnics.

However, board officials believe that a significant number of graduates already in the industry are in fact employed on tasks little different from those at senior technician level. This reinforces the view that technicians can be upgraded to help fill the gap.

The board is paying close attention to two courses being run at Brighton College of Technology and Bracknell College, both designed to train software technicians and software technician engineers to help meet the shortage of software engineers.

A study of the project by the Science Policy Research Unit, at Sussex University, concludes that management attitudes are the main influence in determining a company's willingness to employ software technician engineers instead of professional engineers.

Fewer companies, concluded the research, were interested in employing, in software departments, technicians as opposed to the better-qualified technician engineers. Part of the reason was that this would involve software departments in more training than they had been set up to perform. Companies which had a good training record were more willing to employ technicians.
Source: Financial Times

Shaping the future

In June the Confederation of British Industry launched Vision 2010, a 21-strong group of young executives who will work on a blueprint for British industry's future, reported the *Financial Times.*

The team of 19 men and two women with an average age of 31, have been chosen by the CBI from a range of large and small UK companies to produce a vision of British commerce to the year 2010 and beyond.

They have been recruited from the electronics, chemicals, energy, engineering, finance, retailing, communications, pharmaceuticals and leisure sectors.

The group aims to study the trends of the social and economic environment worldwide into the 21st century, define the products and services which the UK should provide, and identify the changes needed to be fully prepared.

Sir Terence Beckett, CBI director-general said, 'Too many in Britian tend to bumble through. We have a deeply entrenched belief "that it will be all right on the day."

'The Japanese think ahead, plan ahead extremely successfully. We must do the same. Much of their success can be attributed at least in part to their development of visions of the future, and of strategies to achieve these goals.'

He said the CBI had decided to get a group of people under 35 who had shown by their achievements that they would be the future leaders in industry and commerce.

Their study would cover labour and manpower questions, natural resources, cultural shifts, expectations of the quality of life, attitudes to work, leisure and the environment, and the distribution of wealth, including third world matters.

The group will present an interim report to the CBI's tenth annual conference, in Bournemouth in November, and a final report in May 1987.
Source: Financial Times

Energy efficiency 1986

Extended energy survey

W S Atkins have been awarded a contract to carry out an *Extended energy survey* at the York factory of Rowntree Mackintosh. The study, which will last for some six months, will encompass all energy use on the site, including that used in the confectionery process itself as well as in the various services such as compressed air, refrigeration and steam.

The overall study will identify where the energy is being used on site and hence allow Rowntree Mackintosh to allocate precisely energy costs to the various cost centres. Projects and modifications that are judged to yield significant energy savings will be highlighted.

The potential savings for each project will be calculated and any required capital outlay quantified. Wider aspects such as effective energy management, monitoring and targeting, centralised plant *vs.* decentralised plant and combined heat and power will also be studied.

Reader enquiry no 9/1

Cummins Engines achieve energy saving with Nordsea

A saving of over 35% has been achieved with an expected payback period of less than two years at the Darlington works of Cummins Engine Co, manufacturers of diesel engines. The old oil-fired central boiler plant which provided medium pressure hot water to fan-assisted radiators for heating the factory has been taken out. **Nordsea** direct-gas-fired pressurised make-up air units now provide factory heating. Nine Nordair heaters supply high-volume low-velocity warm air to provide a comfortable working environment. These are installed in the roof space to keep the factory floor clear for production. Advantages over the previous boiler include, it is claimed, virtually 100% heating efficiency, elimination of electrical air extract-fans, draught elimination which allows reduced temperature settings, rapid warm-up whenever heating is required, reduction in maintenance costs, and the elimination of fuel inventory.

Reader enquiry no 9/2

New version of mini-boiler

The 12D gas mini-boiler is now being marketed by **Maxol** in an optional version with an integral solenoid valve. This offers further flexibility, and precise, responsive control when used in conjunction with a pump and/or timer clock, or as part of Maxol's low-cost Homewarm gas heating system.

An advantage of the 12D is its slimline styling. The 550 mm x 305 mm mini-boiler is only 191 mm deep, allowing location within a kitchen wall unit as an alternative to traditional boiler positioning inside a kitchen base unit or on a kitchen wall.

Reader enquiry no 9/3

Unflued heater

The Temcana RC 302 is a natural gas, unflued heater with fanned convection, introduced by **Vulcana Gas Appliances** for both domestic and commercial locations where the installation of a flue is impracticable.

The efficiency of the new wall-mounted heater, which has an output of 3.5 kW at its high setting and 1.32 kW at its low rate, is claimed to be virtually 100%. The Temcana RC 302 and the Temcana 82F radiant convector heaters are the only unflued gas room heaters which have been tested and certified by British Gas. The new heater must be fitted in a ventilated area which has a volume of not less than 70 m^3 - or an internal space with a volume of not less than 35 m^3.

The appliance is protected against oxygen deficiency by means of a comparator which switches off the system should a fall in millivolt output occur. Ignition is automatic, dispensing with the requirement for a pilot light. The Temcana RC 302 automatically adjusts both its heat output and its convection fan on a 'high - low' cycle, whilst control from 'low' to 'off' is manual.

Reader enquiry no 9/4

Pump analysis software

PUMPALC, a pump analysis program for the IBM PC, is now available from **Software Systems Corporation.** Designed to be used as a tool to assist the engineer in selecting the option pump equipment, PUMPALC determines the energy and power requirements for pumping systems based on the piping system, pump, demand profiles and control options selected. Optional economic analysis evaluates variable speed drive feasibility. A detailed report on pump performance output is provided as well as informative graphic displays.

Reader enquiry no 9/5

Microcomputer burner control system

Honeywell's R7241 microcomputer burner control system has now received full certification from the British Gas Midlands Research Station, at both 110 V and 240 V. This is the first unit of its kind to obtain such approval.

The R7241 microprocessor-based system offers the required response and accurate sequence timing, continual monitoring and status indication and its own dynamic self-checking fail-safe features. It is also able to give 'First out annunciation' and can communicate with other microprocessor-based equipment such as computers or printers.

The diagnostic capabilities of the burner control system are enhanced with the addition of the Q 7241 intelligent printer interface. This self-contained, unit is, it is claimed, easy to install and enables up to eight burners to be connected up to one printer. By connecting a printer, the functioning of an installation can be improved, while system downtime can be minimised.

Because of the communicating ability of the R 7241, one operator in a central control room is able to survey an entire site with burners in several locations.

Reader enquiry no 9/6

Process control and management information system

A flexible and powerful process control and management information system, the MOD 300 system, has been introduced by **Combustion Engineering,** Taylor Instrument Division.

For the first time , it is claimed, process plant operators have a fully integrated system to meet all their control requirements. All aspects and sources of data acquisition, control, operation and presentation are combined, eliminating conflicts often experienced with other distributed control and management information systems, and providing optimum process control for all plants.

The design consists of a family of subsystems interconnected by a distributed communication network. It is both functionally and geographically distributed, and works, it is claimed, in virtually any combination. Complete integration provides increased power and flexibility to the operator, engineer or manager and, because improvements in plant control can be achieved by configuration rather than hardware alteration, the system provides a cost-effective approach to new installations as well as plant upgrades and modernisations.

Reader enquiry no 9/7

Supercomputer for Harwell

The United Kingdom Atomic Energy Authority has ordered from **Cray Research** a CRAY-2 supercomputer for the Harwell Laboratory. The system will be delivered in the first quarter of 1987, and is scheduled to be operational by mid 1987. In the interim Harwell will replace the present CRAY 1S system by a X-MP/24 computer pending installation of the CRAY-2.

The CRAY-2 computer comprises a 256 million word (2 Gigabytes) memory and four central processors running at 4 nanosecond cycle time. The system is cooled by an innovative liquid immersion cooling system. Access to the facility will be through existing IBM and VAX front end computers at Harwell. The important new facility will enable previously intractable problems to be tackled in major scientific and technical fields, as the CRAY-2 is the largest and most powerful supercomputer currently available.

Reader enquiry no 9/8

Combustion analysing systems

The Syconex Series 5000/6000 combustion analysis systems have been introduced by **Energy Technology and Control** to meet increasing international pressure for the monitoring and control of stack emissions.

These across-the-stack infra-red analysers have been developed for *environmental monitoring; combustion control; process analysis;* and *industrial ambient and area monitoring.* They provide a single beam, gas filter correlation, double sample pass and non-dispersive infra-red analysis.

The amount of light absorbed by the gas sample is measured at wavelengths specific to the sample concentration. Interleaving and non-sample-absorbing wavelengths are measured as a reference, and the ratio of these two measurements provides an analysis of the sample which is insensitive to variations in transmitted light intensity.

The calibration process, utilising the measuring beam itself, which has passed through the sample, provides complete compensation for all variations in background - CO_2 and H_2O as well as particulate density and window coating. A programmable gain amplifier circuit maintains appropriate signal levels into the electronics, whilst a simple mechanical and optical design, it is claimed, maximises reliability.

The system includes a gas stream mounted sensor and a centrally located signal processing unit, with an RS422 link between them. In addition, there are one digital and two analog outputs and a sample temperature measuring probe.

Reader enquiry no 9/9

Trade publication

NIFES design services The **National Industrial Fuel Efficiency Service** has published a new, full colour brochure which aims to illustrate the consultancy's additional special expertise in designing mechanical and electrical engineering services for its clients. Almost half of NIFES' professional and technical engineering staff specialise in this field and now have the benefit in all offices of computer based design aids. These include the *Environmental system performance* software developed by Strathclyde University, which allows the construction of a detailed computer model of any proposed or existing building. In this way, a design team can identify potential plant and building modifications, energy saving strategies and potential building services problems.

Reader enquiry no 9/10

ENERGY WORLD — COMMERCIAL
(Photocopy acceptable)

Please send me further information against the reader enquiry no(s) listed below (please tick)

9/1 9/2 9/3 9/4 9/5 9/6 9/7 9/8 9/9 9/10

Name .....

Address .....

.....

Organisation .....

Annual general meeting

The 59th annual general meeting and special general meeting were held at 18 Devonshire Street, London, W1 on Tuesday, 27 May 1986. The president, **P C Warner,** was in the Chair.

The Notice of the Meeting was taken as read. The minutes of the 58th annual general meeting held on 23 May 1985 were agreed and signed by **the president.** The minutes of the special general meeting,, held immediately after the 58th annual general meeting were also agreed and signed by **the president.**

Annual report and accounts

The president said that with regard to the International Committee report Council was grateful to Bill Tipler for the way he had encouraged them to take a proper interest in the international scene, and for his sponsorship of the new policy statement which had been published in *Energy World.*

G J Gollin said that he would have expected to see a small paragraph in the report headed *Obituary.* The reason he raised the point was that since the last meeting past-president Dr H E Crossley had died. **Mr Gollin** paid tribute to the amount of work that Dr Crossley had done for the Institute, and said that it was through his efforts that the Commonwealth Fuel Committee was re-established. **Mr Gollin** said that he regretted that there was no paragraph in the report notifying members of the death of an outstanding member of the Institute, such as previously Dr D T A Townend, another distinguished past president. He thought it would be appropriate for future annual reports to contain a reference to any distinguished members who had died during the year. This was agreed.

The Benevolent Fund

The president said that the Benevolent Fund continued to have a mystifying lack of applications for assistance at a time when it was believed that there must be hardship somewhere. The Institute was simply not reaching the people who might be in need and similarly such people were not aware that they ought to be applying to the Institute for support.

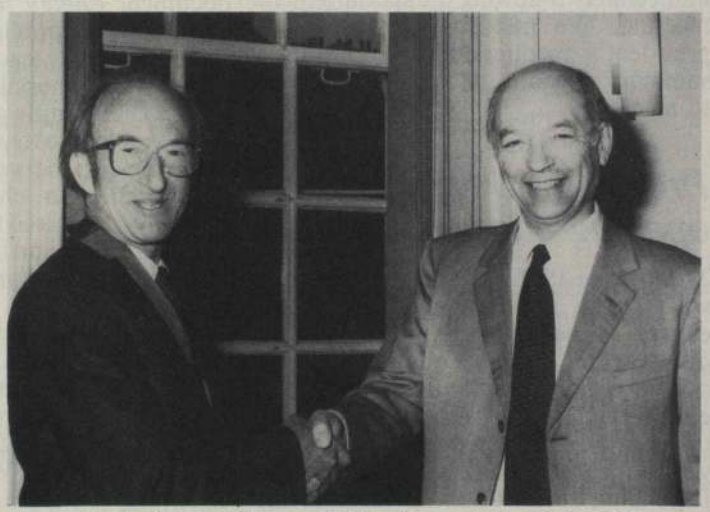
Dr W A Simmonds (hon treasurer) said that the current interest was in extending the activities of the Fund slightly, maybe to students, for example, where it was suspected that there were cases of hardship. At present the rules of the Fund did not allow this to be done and so they would have to be changed. Everybody who had been consulted so far thought that this was an admirable proposal. So work was just beginning on that.

G J Gollin said that it amazed him that out of the £26 000 in the Fund £18 000 was cash on deposit. The Institute did not have a daily drawing from the Fund, and as the bank did not give a good return on deposits he thought better ways of investing that money could be found, perhaps in gilts.

Dr Simmonds replied that this was the way accountants liked to write balance sheets.

J Banerjee (accountant) said that part of the money was invested in the National Savings Bank earning 11½% interest on which the Institute did not pay tax, and at this time the bank or special certificate account was giving them around 9.37%.

Dr Simmonds said he had anticipated a similar question on the main accounts which were itemised due to accounting procedures, under bank account balances, and again the money was invested in the sort of funds **Mr Banerjee** had just mentioned. Just after the year end, funds had been moved to the sort of



Above: Mr P C Warner reading the 1985 Annual Report and Accounts at the Institute of Energy AGM. Above right: Mr P C Warner invests the new president, Prof J Swithenbank. Below left: Prof Swithenbank presents Mr Warner with the past-president's badge and tie. Below right: Prof Swithenbank closing the AGM

investment that **Mr Gollin** had mentioned, but in any event the money was certainly not just lodged in a bank account.

N G Worley noted that the Institute had in fact spent about £50 in assistance last year. Without wishing for any details, he asked whether it was possible to give some indication of the sort of assistance that had been given.

Dr Simmonds replied that they paid members' subscriptions for members in difficulties, but, after consulting the branches about this, they had only discovered a few needy cases.

E Moore suggested that, while respecting the point made by **Dr Simmonds** with regard to the formality of accounting statements, in order to prevent concern of this nature troubling members in future, would it be reasonable to add one or two explanatory footnotes at the botton of the balance sheet, which would in no way interfere with the presentation of the accounts but would quieten members' minds that in fact the Institute had placed funds at best advantage.

Dr Simmonds agreed.

The president said this was a helpful suggestion. There was of course an entry for interest on the income side and one could do a bit of mental arithmetic, but not everybody wanted to do that.

Election of auditors

The resolution that Messrs Touche Ross and Co, chartered accountants be re-elected to serve as auditors for the ensuing year and that their remuneration be fixed by the Executive Committee was proposed by **B G Gills** and carried. Messrs Touche Ross had formerly practised as Till Temple Gothard.

New members of Council 1986-87

The president announced that the following members of Council were declared to be reappointed to serve for a further year: **C R Coleman, B Lubert OBE** and **W Tipler.** Also the undermentioned Corporate Members were declared members of Council, to take office from the conclusion of the meeting, no ballot being necessary because the number of nominations had precisely equalled the number of vacancies: **B G Gills, the Revd Dr J H Harker, C R E Hillyer, D A Thompson** and **A J Williams. A J Williams** was the chairman of the Education and Trainin Committee.

There being no other business th annual general meeting was closed.

Special general meeting

The Notice of the Special Genera Meeting was taken as read. **The presiden** said that the Notice was accompanied b a schedule setting out the change proposed to the Bye-Laws witl explanations. The resolution for th amendments was proposed by **B Haye** and carried unanimously.

The president then proceeded with th formal investiture of the new president Prof J Swithenbank , with his badge o office.

The president thanked the meeting. H said that he was now delighted to perforn the function of presenting th immediately retiring president, P C Warner with a past-president's badge an tie. There was acclamation and th meeting was closed.

Council

A meeting of Council was held at the Institute of Energy on 27 May 1986, immediately following the special general meeting. We publish below first the president's opening address, and then a summary of points that may be of interest to members.

Prof J Swithenbank's opening address

The year of Philip Warner's presidency was one of continuing change in the energy scene, including: a dramatic decrease in the price of oil, the end of the miners' strike and an 'interesting' nuclear episode in Russia. Philip led the Institute through these and less traumatic events with both wisdom and wit. I am sure that I speak on behalf of all the membership in thanking Philip for contributing, to the the Institute, his charisma, business acumen and financial wizardry, and his skill as a communicator. Some highlights of his year of office were:

- ☐ The inclusion of the Institute of Energy on the second list of the Engineering Council's *list of nominated bodies* fitted to certify the attainment of individuals for CEng, TEng or Eng Tech status.
- ☐ The formal participation of Technician Engineers in the work of Council.
- ☐ Increase the technical strength at headquarters.
- ☐ Re-organisation of the funding of the branches.
- ☐ The creation of the International Committee of the Institute.

Many of the actions which Philip initiated or encouraged will bear fruit during my year of office. These include the issue of student information packs later this year, and I am particularly pleased that there will be an updated second edition of our classic energy policy document *Energy for the future* which was originally published in 1973.

This naturally leads me to consider the future and especially the year ahead. Rather than simply giving a list of topics that I would like to emphasise, I felt that a 'theme for the year' would be more appropriate. In choosing a theme I carefully considered the overall role of an energy engineer and the part played by the Institute of Energy in fulfilling his or her role.

To put our discipline in perspective, you will recall that in the UK we currently spend about £35 000 M pa on energy. This represents more than the total that we spend on education and the Health Service combined. We even spend more on energy than we do on food. It is therefore clear that we energy engineers carry a great responsibility for the economic success or otherwise of the country. These facts also account for the great strength of the Institute of Energy. For example, the topic of health alone is supported by many professional groups, so that it is not surprising that our membership is consistently large and stable in spite of the relatively non-aggressive attitude towards recruitment.

Nevertheless, I believe that the true success of an organisation such as ours depends on the morale of the members and the mutual goodwill between the members, Government, industry and the public at large. The essence of goodwill is communication, and hence I believe that the theme of 'enhanced communication' should be at the heart of Institute activity for the next period.

Communication can occur at many levels and by various means. First, consider that communication between th various engineering institutes should b improved. In the past we have ove emphasised the boundaries betwee institutions and not taken full account o the *overlap* between variou classifications of engineer. For example there is a definiate overlap between all th engineering disciplines in the area o instrumentation, and in this case it is ever difficult to distinguish between the role o the pure scientist and the engineer. Th Engineering Council was formed partly i response to this situation.

The role of the Institute of Energy i particularly interesting in this respec since we have successfully integrated th application of most of the facets o engineering into products for the efficien production and utilisation of energy. This broad base is reflected in the mode degree scheme used for our degree accreditation procedure. This scheme calls for a thorough and integrated degree course, but allows flexibility in the area of specialisation. This approach also has an advantage when compared with highly prescriptive courses of engineering since it is difficult for them to respond quickly to the rapid changes in technology which are being experienced at present. There are indications that the Engineering Council appreciates the need for improving the treatment of the overlapping areas within engineering. Since we have experience already in resolving this problem, I believe that we have a great deal to offer to the Engineering Council in this respect.

Growth areas in engineering communication also involve the digita computer, which is now moving from its role as a mathematical 'number cruncher' to a much wider role. Thus the computer

s now involved in assessing market needs, communicating design information between engineers, communicating instructions to the machines which manufacture the products, and even in advertising the products for sale. I consider that the Institute should investigate its contribution to this field possibly through such means as our direct involvement with electronic data banks providing information on equipment, instrumentation and personnel.

Thus 'enhanced communication' means:

- ☐ More communication between members and branches
- ☐ More communication in both directions with headquarters
- ☐ More communication at the international level through the EEC and through our newly formed International Committee
- ☐ More communication with our sister engineering institutions
- ☐ and last, but not least, in Industry Year, more communication on energy matters with industry

Summing up, I would like to draw an analogy between the Institute of Energy and an orchestra. The branches of the Institute are equivalent to the sections of an orchestra: the strings, the wind instruments, the percussion and so on, (I leave you to decide which represents your branch). In order to produce a coherent result, it is essential that all the branches are playing the same tune, although they each contribute in their own way. From time to time one branch or even one individual takes the lead. The president, Executive and Council fulfill the role of the conductor. It is their task to keep the various members of the orchestra in synchronisation and to indicate the appropriate time for the intervention of the specific branches. However, it should be noted that the conductor simply communicates and does not usually make any sounds himself. The choice of the music to be played must be mutually agreed and must reflect the skills of the players. Similarly, skills can be enhanced by training and practice. The overall result is much better than any individual or branch could achieve in isolation. When the whole orchestra is in harmony, the overall result is magnificent and earns applause from the public.

Clearly such analogies cannot be taken too far, but do serve to emphasise the importance and benefit of energy engineers acting together as a team with mutual respect, goodwill and 'enhanced communication'.

Melchett Medal

It was agreed that the Melchett Medal should be awarded to *Sir George Porter,* president of the Royal Society and a Nobel prize winner. The lecture would probably take place in March 1987*.

*Tuesday 24 March 1987 (see Special Announcements, p 25)

Single transferable voting system

Council approved the proposed regulation relating the use of the single transferable voting system for future Council elections.

Branch affairs

The president said that he hoped to have visited all the branches by the end of his presidential year. He explained that he had relinquished the chairmanship of the International Committee, which had now been taken over by *Dr E G Masdin* (president-elect), and went on to mention some of the work undertaken by the International Committee.

Membership interviewing procedures

In reply to a request from the East Midlands branch, Membership Committee chairman, *J P MacCarthy,* said that a paper giving guidance had been produced. In order to standardise interviews, a revised checklist would be sent to the branches together with a general invitation to attend a Membership Committee meeting and an interview.

Branch chairman

The South Coast branch asked whether a non-corporate member would be eligible for election as chairman of a branch. *Dr W A Simmonds* (honorary treasurer) undertook to find out the Engineering Council's views on this question.

Eligibility of energy professional for corporate membership

L A N Tozer asked for advice on the qualifications and experience required for corporate membership without CEng registration. Mr MacCarthy confirmed that there was no reason why energy professionals should not be put forward for membership; all cases would be considered on their merits. He was asked to produce a table showing the numbers who apply for corporate membership without CEng registration together with the numbers that are turned down.

Advertising

C R Coleman said that the Institute's regulations prohibit direct advertising by members and asked if there was any intention to review what is and is not allowed. It was agreed that the Executive Committee should discuss the matter.

Branch boundaries

The Executive Committee would also look at the matter of branch boundaries, in response to a specific question from the Yorkshire branch. They explained that North Humberside is in the Yorkshire branch, whilst South Humberside is in the East Midlands branch.

Executive

Council approved two recommendations of the Executive Committee: that there should be a single registration fee of £10 for students, which would cover the duration of their undergraduate course; and that the initial application fees and transfer fees should be increased.

Executive Committee chairman, *Dr G G Thurlow,* also reported that *B G Gills* would be joining the Executive Committee.

Membership

Council approved unanimously the proposal of the North-Eastern branch that the Recognition of Services Award should be given posthumously to *Arthur Strong.*

Mr MacCarthy reported that the production of student information packs was under way. It was agreed that branches should arrange the distribution of these packs. Each branch would need an officer to liaise with the universities. It would be useful if each university liaison officer informed the Institute about how the packs were distributed and gave any feedback.

C R Chapman had been invited to join Membership Committee.

Mr MacCarthy asked for suggestions on membership recruitment to be sent to Membership Committee. This subject would also be discussed by the Executive Committee. *W Tipler* suggested that the reasons why members resign from membership should be examined and offered his assistance in this.

It was also thought that improved promotional information on the Institute was necessary. Mr Tozer suggested that an information issue of *Energy World* giving the broad range of subjects covered by the Institute of Energy might be beneficial.

Publications and Conferences

N G Worley, Publications and Conferences Committee chairman, said that there was a full programme of forthcoming conferences planned.

He reminded Council that both the *Journal* and *Energy World* are very dependent on contributions, so any additional articles would be appreciated.

Nominations

The secretary reported that at the conclusion of the AGM to be held in May 1987, the following three Council

(continued on p 24)

members will be required to retire having then completed five years on Council:

C R Coleman
B Lubert
W Tipler

The two following members of Council will be required to retire, but will be eligible for re-election:

L A N Tozer
N G Worley

The honorary treasurer, *Dr W A Simmonds,* will have completed five years in office. Nominations will be required for chairman of the Executive Committee and for one vice-president.

Nominations should be sent to the secretary to arrive not later than 30 June 1986.

Institute of Energy
1986 October meetings

Midland

2 Oct (Th). Chairman's address: A look at process combustion today, by R A Freeman. University of Aston in Birmingham, Senior Common Room at 1900 h.

North-Eastern

6 Oct (M). Student evening. Cooperage Public House, Quayside, Newcastle-upon-Tyne at 1930 h.

Scottish

7 Oct (Tu). Energy efficiency demonstrations in the brewery and distilling industries, by Ian Melville (Industry Dept for Scotland). Royal Scottish Automobile Club, Blythswood Square, Glasgow at 1830 h (tea/coffee and sandwiches at 1800 h). Joint meeting with CIBSE.

Yorkshire

8 Oct (W). Technical meeting and tour of works. Senior Green, Wakefield at 1000 h.

North-Eastern

15 Oct (W). ECRO Annual Lecture: *Nissan: from airstrip to production line,* by C P Towl (Nissan (UK)). Curtis Auditorium, Dept of Physics, University of Newcastle upon Tyne at 1830 h.

North-Eastern

21 Oct (Tu). Electrification of the East Coast main line, by Mr Payne (British Rail). Dept of Engineering, University of Durham, South Road, Durham at 1800 h (refreshments available from 1730 h).

East Midlands

21 Oct (Tu). ECRO (East Midlands) Prestige Lecture: *Technological change: the effect on people at work,* by Sir Richard O'Brien (chairman, Policies Study Institute). Lecture Theature T1, University of Nottingham at 1830 h (coffee and biscuits from 1745 h).

North-Eastern

22 Oct (W). Hands-on computer experience. Dept of Civil Engineering, Computer Laboratory, 5th floor, Main Building, Teesside Polytechnic, Middlesborough at 1400 h. Joint meeting with Teesside Energy Managers Group. For details contact M G Burbage-Atter, Teesside Polytechnic (tel 0642 218121 ext 4259/4155).

London and Home Counties

28 Oct 1986 (Tu). Chairman's lecture, by Peter H Johnson: *Responding to the energy challenge.* Chairman: Dr Guy Masdin (president-elect). Royal Institution, Bernard Sunley Theatre, Albemarle Street, London W1 at 1730 h (tea at 1710 h).

Midland

Oct. Students' introductory evening. Details to be arranged.

Obituary

We published on pages 16 and 17 of the July issue tributes to the late Donald Hicks OBE by Dr D A Hall and by Dr L C F Blackman. A D Makower (Fellow), former director of British Coal's Scientific Control, now contributes an appreciation of Donald Hicks's work on airborne dust in coal mines and on pneumoconiosis.

Donald Hicks came to London in 1947 as director of Scientific Control of the then National Coal Board after spending most of his life in South Wales. He was, accordingly, fully aware of the devastating effect that pneumoconiosis was having on the health of coal miners. He was determined to do something about it.

The timing of his appointment was opportune as the National Joint Pneumoconiosis Committee representing all interested parties and chaired by the Parliamentary Secretary to the Ministry of Fuel and Power was considering pneumoconiosis and airborne dust in coal mines as a matter of urgency. Hicks played a major part in the work of this committee. It was he who persuaded the NCB to accept the committee's scheme for the regular monitoring of airborne dust concentrations at working places and to introduce it on a voluntary basis. He had, in fact, played an important part in drafting the scheme.

The introduction of the scheme was not easy, because, at the time, there were insufficient dust sampling instruments. Most of the instruments that were available did not allow for the evaluation of dust in the important 1 to 5 μm size range, the size range primarily retained in miners' lungs.

By the early 1950s the sampling scheme was in full operation with the then recommended sampling instrument, the standard thermal precipitator (STP); the dust particles collected by the STP in the 1 to 5 μm range for coal dust and ½ to 5 μm range for stone dust being counted and related to the quantity of air sampled. In the years up to 1960, under HIcks's direction, the sampling scheme was progressively improved; the sampling schedules being made more effective by basing them on statistical concepts.

Equally important, in the early 1950s the Board's chief medical officer, Dr John Rogan, and Hicks obtained National Coal Board approval for a major research project at 24 carefully chosen pits. The object was to study the relationship between the prevalence and progression of pneumoconiosis in coal miners and the concentrations of airborne dust in the respirable range in working places. The influence of other factors such as the size consist of the dust, coal rank and the nature of the mineral matter in the coal and the stone produced during mining were also to be investigated.

The project was particularly important because at the time, only a very broad correlation existed between the measured dust concentrations and the prevalence and progression of the disease. The research, which continued for many years at those of the 24 pits still open, has proved rewarding; much more is now known about the relationships between concentrations and types of dust and pneumoconiosis.

As would be expected, considerable further progress has been made in the 25 years since Hicks was involved in the subject. Better dust control measures are in operation in mines. Improved dust sampling instruments have been developed and used. The frequency of dust sampling has been greatly increased. The prevalence and progression of pneumoconiosis in coal miners has been much reduced.

Much credit is due to Donald Hicks not only for what he, himself, achieved but also for laying sound foundations on which others have subsequently been able to build.

A K Waugh (Associate), who died on 8 March 1986 at the age of 83, joined the Institute in 1967.

Mr Waugh founded his company, A K Waugh Limited, in 1940-41 and over the years developed a considerable reputation in their particular field of specialising in the manufacture of fuel oil heating equipment. He was very well known by all those in the principal oil companies who dealt with heavy oils.

He was a committee member of BCEMA and, on retirement, was made an Honorary Member of this Association, only the second to be so appointed.

We have also been informed of the death of the members listed below. The grade of membership at the time of death and the year in which the member joined the Institute are shown after each member's name.

H J Garrett (Member, 1964)
Allan Law (Fellow, 1940)
J J Smith (Fellow, 1958)

□

(Institute news continued on p 27)

53rd Melchett Lecture: preliminary announcement

Sir George Porter FRS, president of the Royal Society, will deliver the Institute of Energy's 53rd Melchett Lecture in the lecture theatre of the Royal Aeronautical Society on Tuesday 24 March 1987 at 1730 for 1800 h.

Energy Industries Club

Following the retirement of Dr R Jackson, *Dr George Thurlow* has been appointed honorary secretary of the Energy Industries Club. As from the start of the new session, all correspondence concerning the Club should be addressed to him at: Dell House, Green Lane, Malvern Wells, Worcs (tel 6845 4481).

Notices concerning the first meeting of the 1986/7 session, to be held at the Connaught Roms on 21 October 1986, will be sent out at the end of September.

Special interest group: Nonlinear studies

Earlier this year the SIG on *Catastrophe theory* officially changed its name to the special interest group on *Nonlinear studies* in order to convey the wider interests of its members. The main focus of the group is to examine some of the startling new areas in nonlinear mathematics that have developed in the past few years — what is often termed as a revolution in mathematics. There is *Bifurcation theory* — the study of the number and types of states open to some systems (used with great effectiveness in combustion chemistry); *Catastrophe theory* — (cf. previous articles in IoE publications); *Fractal geometry* - the study and measurement of the properties of complex and irregular curves (eg the edge of flames, the surface area or porosity of coal particles); *Chaos dynamics* — attempts to examine the deterministic causality behind chaotic and random behaviour; *Solution theory* — the study of nonlinear waves, self-propagating in turbulent fluids; etc. There are also many soft concepts and implications which are worth inspecting.

There are currently 29 members in the group, 50% from industry. If you are interested in learning and being associated with this exciting and rapidly growing science, please contact the group leader: Olinga Ta'eed, Dept of Fuel & Energy, Leeds University, LS2 9JT, UK.

Institution of Chemical Engineers: Coal Utilisation subject group

The inaugural meeting of the Coal Utilisation subject group, set up by the Institution of Chemical Engineers, was held on 17 June 1986 at British Coal, Coal Research Establishment, Cheltenham. The group will provide a very useful forum for those involved in all aspects of coal utilisation, and the honorary officers are looking to a strong membership from the Institute of Energy as being essential for the group's success.

The meeting was well attended by members from both industrial and academic fields; an introduction was provided by *Glyn Davies,* the group's convenor and a welcoming address by *Jim Harrison, Miss Fiona Denby* and *Miss Imelda Topping* provided a background to the Institute's involvement in the establishment of, and support for, the subject group.

Dr John Topper then set the scene for the group with a short presentation on recent developments in coal handling. A discussion period followed in which the function and objectives of the group were debated; the consensus of opinion being that the group would provide a forum in which interested parties could discuss openly all aspects of coal utilisation. Initial meetings would be under general subject headings but later meetings would home-in on more specific topics and problem areas which are of special interest to members. Meetings will be informal with the emphasis on open discussion. Invited speakers would not be expected to produce written papers.

The activities of the group may well result in the overlap of technologies with other subject groups. Joint meetings may be held in which engineers from other disciplines and spheres of activity can share their knowledge and experience, throwing new light on problem areas.

The election of officers tok place after the discussion period:
Chairman, *Glyn Davies,* British Coal
Secretary, *David Vincent,* Foster Wheeler
Treasurer, *Dr Bill Kyte,* CEGB, Leatherhead
Meetings secretary, *Dr Eric Garbett,* University of Sheffield

First technical meeting: Coal utilisation

The first technical meeting of the group will be held in the Holiday Inn, *Birmingham* on 2 October 1986. The main objectives of this one-day meeting will be to initiate membership and to review the coal scene as it is today. Experts will address selected themes in preparation for open general discussion on coal utilisation. At this session members will idnetify specific topics for detailed discussion at future meetings. The registration fee is £30.00.

Programme

1000-1015 h	*An introduction to the coal utilisation subject group.* G O Davies, (group chairman).
1015-1045 h	*The world coal scene.* A Morgan, (Shell Coal International).
1045-1115 h	*The British coal scene.* M Parker, (Central Planning Unit, British Coal).
1115-1145 h	Coffee.
1145-1215 h	*The variable nature and structure of coal.* Dr P Given, (formerly Penn State College, USA).
1215-1245 h	*The marketing and distribution of coal.* B Corbett, (British Coal).
1245-1414 h	Lunch.
1415-1445 h	*Coal processing — a contractor's view.* Dr W Stockdale, (Foster Wheeler).
1445-1600 h	*General discussion on coal utilisation.* (General question and review of topics for future meetings). Speakers in chair.
1600 h	Tea.

Further information from the group secretary, D J Vincent, Foster Wheeler Energy Limited, Power Systems Division, Foster Wheeler House, Station Road, Reading, Berkshire RG1 1LX (tel Reading (0734) 585211).

The Young Engineers Liaison Committee

The Committee has been formed to represent the interests of young engineers across the complete spectrum of the engineering profession.

Objectives

The objectives of the Young Engineers Liaison Committee as defined by its constitution are:

- To provide a forum for liaison between the younger members of the engineering institutions.

☐To provide links between the Engineering Council and interested bodies and young engineers working towards Chartered or Technician Engineer qualification.

Structure

Chartered Institutions who are nominated bodies of the Engineering Council shall be invited to nominate up to two members, who may be students.

Non-chartered institutions who are nominated bodies of the Engineering Council shall be invited to nominate one member, who may be a student.

The committee shall be empowered to co-opt up to six members.

Further information from the secretary, Vaughan Thomas 59 Rachel Point, Muir Road, Hackney, London E5 8PF.

Combustion research colloquia: Imperial College, autumn term 1986

28 Oct (Tu). Dr C H Priddin (Rolls Royce, Derby).
Practical applications of computational fluid dynamics to gas turbine combustors.

25 Nov (Tu). Prof G Dixon-Lewis (Dept of Fuel and Energy, University of Leeds).
Numerical modelling of strained flames.

9 Dec (Tu). Dr C Vovelle (Centre national de la Recherche Scientifique).
The structure of laminar diffusion flames in relation to soot formation.

Colloquia to be held at 1545 h (tea will be available from 1530 h). Visitors welcome without fee or formality. Synopses of colloquia will be available a week beforehand and will be sent on request.

Further information from Prof F J Weinberg FRS, Dept of Chemical Engineering and Chemical Technology, Prince Consort Road, London SW7 2BY (tel 01-589 5111 ext 4360).

Watt Committee: twentieth consultative conference
Gasification: its future role in the economy of the United Kingdom

The Watt Committee on Energy announces that its twentieth consultative conference will be held at the Institution of Civil Engineers, London on Wednesday 3 December 1986.

Theme: *Gasification: its future role in the economy of the United Kingdom.*

The conference is being planned by a working group of the Watt Committee under the chairmanship of Dr A B Hedley (FInstE). The programme will comprise informal presentations by invited speakers, with time for discussion. Printed papers will not be available, but participants will be supplied with synopses of the presentations. It is hoped that the conclusions of the working group will be published subsequently as a Watt Committee report.

Further information from the secretary, Watt Committee on Energy Ltd, Savoy Hill House, Savoy Hill, London WC2R 0BU (tel 01-379 6875).

Energy from biomass and wastes

The Institute of Gas Technology (IGT) has issued a *call for papers* for its eleventh annual symposium to be held at the Hotel Royal Plaza in Walt Disney World Village, Lake Buena Vista, Florida from 2-6 February 1987.

Papers on original research, case histories of comercialised systems, and economic analysis are invited. The topics to be covered are:

☐*woody, herbaceous, and aquatic biomass production and procurement;*
☐*biomass component separation and utilisation;*
☐*municipal solid waste processing, conversion, and utilisatio*
☐*wood combustion advances;*
☐*cogeneration with biomass and wastes;*
☐*thermal and biological gasification and liquefaction;*
☐*hydrolysis and conversion of cellulosics;*
☐*alcohols and other oxygenated fuels;*
☐*integrated farm-scale and industrial systems;*
☐*genetic engineering advances;*
☐*chemicals from biomass and wastes;*
☐*environmental analysis and controls.*

Abstracts not exceeding 200 words in English should be se by *1 October 1986,* to Ms Susan Robertson, Institute of G Technology, 3424 South State Street, Chicago, Illinois 6061 USA (tel 312/567/3881; tlx 25-6189).

Engineering trade mission to the USS

The Engineering Industries Association (EIA) is organising trade mission to the USSR for one week from 8-13 Februa 1987. The mission, which has British Overseas Trade Boa support, will be based in Moscow. Return travel and fi nights accommodation will cost £318. The BOTB travel gra is £270 for companies on their first, second or third visits the USSR on a BOTB suported mission and £135 for a four visit. The closing date for application is *31 October 1986.* T USSR is seeking to modernise existing plant in order upgrade production. Other promising opportunities are *energy conservation* and electronic technology.

Further information from Anna Small, export directo EIA, 11 Dartmouth Street, Westminster, London SW1H 9B (tel 01-222 2367).

Pneumatech 3: call for papers

The third international conference on *Pneumatic conveyin technology* will be held in the Grand Hotel, Jersey, Chann Islands from 24-26 March 1987. The programme will includ all aspects of this technology, including fundamental researc technology, equipment, industrial case studies, proce instrumentation and control, economics, compute applications etc.

Abstracts from intending authors should be submitted b *31 October 1986.* Instructions on presenting these abstracts an further information from the Power Advisory Centre, PO Bo 78, London NW11 0PG (tel 01-455 0011; tlx 895424 (POWDER G)).

Multiphase flows

A Sino-US symposium on *Multiphase flows* will be held a Zhejiang University, People's Republic of China from 3- August 1987.

The purpose of the symposium is to provide a forum fo the exchange of information on the emerging technologica developments in multiphase flows in the People's Republic o China and in the United States as well as in other countries Papers will cover the general areas of gas-particle and ga droplet flows, dense phase flows, fluidised beds, separatio technology, combustion, slurry and powder flows. There wi also be papers on experimental methods, numerical modelling and instrumentation.

This symposium is sponsored by Zhejiang University wit support from the Chinese Society for Mechanics and th National Committee for Education and through participatio by the American Society of Mechanical Engineers. Th symposium organisers are: Prof C T Crowe, Dept o Mechanical Engineering, Washington State University Pullman, WA 99164-2920 (tel (509) 335-8654) *and* Prof Fa Zhengqiao, Dept of Mechanics, Zhejiang University Hangzhou, People's Republic of China.

The papers will be presented and published in *English.* The

ill be bound as symposium proceedings. Selected tours in hina after the symposium wil be available through rrangements with the symposium organisers in China.

Further information from O Ta'eed, Dept of Fuel and nergy, University of Leeds, Leeds LS2 9JT (tel (0532) 431751 xt 435).

ndustrial power

he American Society of Mechanical Engineers are calling for apers for the society's 1987 *Industrial power* conference, hich will be held at the Atlanta Marriott Hotel, Atlanta, eorgia from 25-28 October 1987. The conference will cover ie design, construction, operation, maintenance, financing, nd management of steam- and electric-generating facilities or industry.

Abstracts of no more than one page in length should be sent y *31 October 1986* to George Moran, Technical Programme hairman, Stone & Webster Engineering Corp, PO Box 5200, herry Hill, NJ 08034 USA.

Collaborative research project

he institution of Chemical Engineers is currently inviting nterested companies to participate in a collaborative research roject to obtain fundamental data related to oil and gas ecovery.

The need for more accurate data on the physical and ransport properties of oil and gas at reservoir conditions is idely recognised. While the expertise and equipment to xamine fresh problems when they are encountered is available o most of the major companies, this is not generally so for maller companies. As exploration activities move to a greater umber of smaller and more diverse fields, operators are inding it difficult to obtain the data necesary for field valuation and the design of recovery facilities. In addition, igher pressures and temperatures than those that can be xamined with existing commercially available test equipment re being encountered.

The project, which is to be known as the PVT Project, is expected to have an initial duration of five years and to cost in the region of £5 million. Although information on the project has already been circulated to a range of organizations, any oil and gas exploration and production company which has not received details and is interested in doing so should write to: Miss F M Dendy, head of special projects, Institution of Chemical Engineers, 165-171 Railway Terrace, Rugby CV231 3HQ.

Circulating fluidised beds: call for papers

The second international conference on *Circulating fluidised beds* will be held at the Centre de Recherches de Royallieu, Université de Technologie de Compiègne, Compiègne, France from 14-18 March **1988.**

The second conference is organised by the conference secretariat in cooperation with the University of Compiègne, France. Those who hope to contribute papers to the conference are requested to submit a tentative title of his/her paper or a 300 word abstract by *24 February 1987.*

The tipics covered will be:
(a) hydrodynamics;
(b) heat transfer and mass transfer;
(c) combustion;
(d) environment;
(e) design;
(f) related processes;
(g) process application;
(h) ancillary equipment.

Further information from: *(for countries other than Europe)* Dr Prabir Basu, convenor, Secretariat for international conference on *Circulating fluidised beds,* Technical University of Nova Scotia, PO Box 1000, Halifax, Canada B3J 2X4 (tel 902 429 8300 ext 2043; tlx (TUNS) 019-21566); *(for Europe)* Prof J F Large, Chariman, Local Organising Committee for international conference on *Circulating fluidised beds,* UTC/Chemical Engineering Dept, BP 233, 60206 Compiègne Cedex, France (tel 44 20 99 60; tlx 150 110).

Institute News (continued)

Personal

Three Royal Medals, known also as The Queen's Gold Medals, are awarded annually by The Sovereign on the recommendation of the Council of the Royal Society. **Prof E A Ash** CBE FRS FEng, rector of the Imperial College of Science and Technology, has been awarded a Royal Medal for 1986 *in recognition of his outstanding researches on acoustic microscopy, leading to wholly new techniques.*

W Goldstern (Senior Fellow), after 18 years in Essen, has retired to the United Kingdom. In Germany he served on the executive of VDI-Gesellschaft Energietechnik (with whom the Institute of Energy is in association). He is still a member of the advisory board of VDI-GET.

He has been carrying out consulting work for many years, mainly in the field of thermal storage. Recently, he has carried out work for a power station in Japan and a district heating scheme for the Lower Rhine.

Dr R G Jenkins (Fellow) was promoted to the position of Professor of Fuel Science at the Pennsylvania State University as from 1 July 1986.

Dr G K C Pardoe has been elected chairman of the Watt Committee on Energy in succession to Dr J H Chesters OBE FRS FEng (past president and Honorary Fellow).

Dr Pardoe first joined the board and executive of the Watt Committee as the representative of the Royal Aeronautical Society in May 1981, and was elected deputy chairman later that year; since the expiry of his year of service on behalf of the RAeS, he has remained a member (and deputy chairman) in a personal capacity.

He is chairman and managing director of General Technology Systems, an international technology assessment and consultant company that provides a service to governments and industry on a national and international basis.

W J R Ryder (Fellow) has been appointed an executive director and deputy chairman of the Henry Boot & Sons PLC Group of companies. This appointment carries particular responsibilities for all the building and civil engineering contracting activities of the Group. Mr Ryder was lately on the board of a number of companies in the Babcock International PLC Group of companies.

Dr W Stockdale (Fellow) was appointed to the board of Foster Wheeler Power Products on 1 July 1986 as director of engineering.

Fellowship of Engineering

The first academic research appointment to be created by the Fellowship of Engineering in conjunction with industry has been awarded to *Dr Julia E King,* who took up the new British Gas/Fellowship of Engineering Senior Research Fellowship at the Department of Metallurgy and Materials Science at Nottingham University on 1 September.

Dr King will be investigating the mechanical behaviour of materials relevant to the gas industry with particular reference to off-shore structures and pipelines. She will work closely with British Gas research establishments.

CONFERENCES

The following conferences, courses and meetings are organised by bodies other than the Institute of Energ
For Institute conferences please see inside front cover

October 1986

Industrial power

Conference, Pittsburgh (PA, USA), 4-8 October 1986.
Details from Technical Affairs Directorate, ASME, 345 E 47th St, New York, NY 10017, USA (tel (212) 705-7787).

High-temperature alloys for gas turbines and other applications

Third conference, Liège (Belgium), 6-9 October 1986.
Details from D Coutsouradis, Non-Ferrous and New Materials Branch, Centre des Recherches Metallurgiques, Rue Ernest Solvay 11, B-4000 Liège, Belgium (tel (041) 527050; tlx 41/202 crm b).

Nuclear risks: technical re-appraisals after Chernobyl

International conference, London, 7 and 8 October 1986.
Details from Fiona Spindlove, IBC Technical Services, Bath House (3rd floor), 56 Holborn Viaduct, London EC1A 2EX (tel 01-236 4080; tlx 888870).

Energy recovery

Conference, Essen (FRG), 16 and 17 October 1986.
Details from Haus der Technik eV, Hollestraße 1, Postfach 10 15 43, 4300 Essen 1, FRG (tel 0201/1803-1; tlx 857 669 hdt).

Turbomachinery

First European symposium, Heathrow, (London), 27-28 October 1986.
Details from Mrs Joan Tarrant, Dept of Continuing Education, Brunel University, Uxbridge, Middlesex UB8 3PH (tel 0895 35332).

Preserving gas competitiveness in Europe

Conference, Geneva (Switzerland), 28 and 29 October 1986.
Details from European Study Conferences, Kirby House, 31 High Street East, Uppingham, Rutland, Leics LE15 9PY (tel (0572) 822711; tlx 341352 EUROCON G).

November 1986

Sizewell reactions

Conference, London (Southbank Polytechnic), 6 and 7 November 1986.
Details from Centre for Energy Studies, Polytechnic of the South Bank, Borough Road, London SE1 (tel 01-928 8989 ext 2596).

MHD electrical power generation

Ninth international conference, Tsukuba (Japan), 17-21 November 1986.

November 1986 (continued)

Details from Dr Y Aiyama, Electrotechnical Laboratory, 1-1-4 Umezono, Sakura-mura, Niihari-gun, Ibaraki, 305 Japan (tel (0298) 545280; tlx 3652570 AIST J).

Nuclear power — the glittering prizes

Lecture by C C Horton (Rolls-Royce & Associates), London (ICE), 20 November 1986 at 1730 h (refreshments from 1700 h).
Details from the secretary, Institution of Nuclear Engineers, Allan House, 1 Penerley Road, London SE6 2LQ (tel 01-698 1500).

Gastech 86

Conference and exhibition, Congress Centrum, Hamburg (FRG), 25-28 November 1986.
Details from Brian Singleton, conference director, Gastech 86, 2 Station Road, Rickmansworth, Herts WD3 1QP (tel (0923) 776363; tlx 924312 Gastec).

December 1986

After the fall

Conference, London, 2 December 1986.
Details from European Study Conferences (see address above).

UK coal markets

Seminar, London, 4 December 1986.
Details from Centre for Energy Studies, Polytechnic of the South Bank (see address above).

Energy economy 86

Exhibition and conferences, Amsterdam (Netherlands), 9-11 December 1986.
Details from RAI Gebouw bv, Europaplein, 1078 GZ Amsterdam, The Netherlands (tel 020-5411 411; tlx 12443).

February 1987

Ash: a new resource

Symposium, Pretoria (S Africa), 2-6 February 1987.
Details from Symposium Secretariat S 387, CSIR, PO Box 395, Pretoria 0001, South Africa (tel (012) 86-9211).

March 1987

High-tech buildings

International conference and exhibition, London (Barbican), 3-4 March 1987.
Details from Beverley Banner, Online International, Pinner Green House, Ash Hill Drive, Pinner, Middlesex HA5 2AE (tel 01-868 4466; tlx 923398 ONLINE G).

Analytical chemistry and applied spectroscopy

Conference and exhibition, Atlantic City (NJ, USA), 9-13 March 1987.

March 1987 (continued)

Details from Mrs Alma Johnson programme secretary, 12 Federal Drive Suite 322, Pittsburgh, PA 15235, USA

Biotec 87

International congress and exhibition Düsseldorf (FRG), 17-19 March 1987.
Details from Düsseldorfe Messegesellschaft mbtl, NOVEA Postfach 32 02 03, Stockume Kirchstrasse 61, D-4000 Düsseldorf 3 FRG.

April 1987

Pollution abatement

International fair, Birmingham (NEC 6-9 April 1987.
Details from Ann Grabham, Brinte 178-202 Great Portland Street, Londo W1N 6NH (tel (01) 637 2400; tlx 26256 MUNBEX G).

Diesel locomotives for the futur

Conference, York, 8 and 9 April 1987
Details from Conference Dept Institution of Mechanical Engineers, Birdcage Walk, London SW1H 9JJ (te 01-222 7899; tlx 917944).

Power sources and supplies

First international conference, London 28-30 April 1987.
Details from Miss Laura Christie, ERA Technology, Cleeve Road, Leatherhead Surrey KT22 7SA (tel Leatherhead (0372 374151 ext. 290; tlx 264045 ERALHD G)

June 1987

LP Gas 87

LP Gas equipment and service exhibition, Birmingham (NEC), 9-1 June 1987.
Details from Gary Swinford, sale manager, LP Gas 87, Industrial and Trade Fairs, Radcliffe House, Blenheim Court, Solihull, West Midlands B91 2BG (tel 021-705 6707; tlx 337073).

September 1987

Nuclear interactions and structure

Conference, University of Sussex, 7-9 September 1987.
Details from Institute of Physics, 4 Belgrave Square, London SW1X 8QX (tel 01-235 6111; tlx 91853).

September/October 1987

Building energy management (ICBEM 87)

International congress, Lausanne (Switzerland), 28 September-2 Octobe 1987.
Details from Prof André P Faist, ICBEM 87 secretariat, EPFL-LESO Building 1015 Lausanne, Switzerland (tel 021-47 1 11 (morning); tlx 24 478).