ENERGY WORLD

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EEO and Institute of Energy on the same ground

People find it difficult to think about energy. They know that they need light, or warmth, or motive power; but they rarely think about the energy which is the source of all of these. As a result, energy sometimes does not receive the attention it deserves. My job, as Director General of the Energy Efficiency Office (EEO), is to make sure that it does.

In the five years since the Energy Efficiency Office was set up we have had considerable success in raising awareness of the importance of energy. And as soon as people think carefully about it, they realise that they are wasting a considerable proportion of the energy they consume. Research continues to show that something like 20% of the energy we consume, worth around £8 billion, could be saved through cost-effective investment in proven energy efficiency measures. Failing to take advantage of this opportunity depresses growth, keeps prices higher and profits lower than they might be and damages our international competitiveness. The effects are particularly important for the old and those on low incomes, for whom energy is a higher proportion of their outgoings.

It is not surprising therefore that the Government attaches a very high priority to attacking this waste. Better energy efficiency brings immediate financial benefits both to the individual and to the nation, and at the same time it improves the environment and conserves our fossil fuels.

In the past the EEO has concentrated on raising general awareness of the case for energy efficiency. This has now largely been achieved. Companies no longer consider energy to be an uncontrollable overhead as many used to. Most have realised that it can readily be controlled and reduced. In the

Continued overleaf

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The *Journal of the Institute of Energy* is published quarterly and is optionally available to members of the Institute of Energy wishing to receive it. (To those outside of membership it is available on subscription jointly with *Energy World:* price £102.00.)

Authors and titles of papers published in the *JInstE*, March and June issues respectively are:

March issue

DR S A BELTAGUI and DR N R L MACCALLUM: *Characteristics of enclosed swirl flames with peripheral fuel injection*

S G DAWES, DR G B GIBBS and J HIGHLEY: *The British Coal/CEGB project on pressurised fluidised bed combustion*

DR P N WILD, DR F BOYSAN and PROF J SWITHENBANK: *Spray combustor modelling*

DR S E ALY: *Reverse osmosis desalination by waste heat absorption power cycle*

DR A M GODRIDGE: *Flue gas recirculation in oil-fired plant*

DR G J LYONS, H P POLLOCK and A HEGARTY: *Communication — Fuel properties of short-rotation hardwood coppice sprouts*

June issue

A R BUTT, C J BOWER, R C GREEN, DR N P PATTERSON and J J GALE: *Coal-fired appliances for process heating*

DR W P HUTNY, DR J C Y WANG and G K LEE: *Stability of natural gas and coke oven gas flames in a cylindrical furnace*

D A COOPER: *The influence of ammonia and hydrogen peroxide addition on NO emissions in the glue gas channel of a 16 MW coal-fired fluidised bed combustor*

A SUTHENTHIRAN, S A KHAN, DR S H AHMED and DR M D CARABINE: *The influence of high temperature and residence time on the formation of SO_3 in a premixed laminar flame*

J H BROMLY, F J BARNES and DR L H LITTLE: *The effect of low levels of CO, H_2 and hydrocarbons on NO_2/NO ratios in heated gases*

DR J S DENNIS and DR A N HAYHURST: *A model for the continuous desulphurisation of a fluidised bed combustor using limestones, dolomites or related solid sorbents*

DR O OGUNSOLA and DR J J RUETHER: *NO and smoke emission characteristics of coal-derived liquid fuels fired in a process furnace*

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domestic sector too awareness of the value of common sense energy efficiency measures is now very high.

It is therefore time for the EEO to move into a fresh phase of activity. In future we will be focusing our work in certain key areas. In the industrial and commercial sector we will offer a better regional service through the network of 12 regional energy efficiency officers. They will help companies to identify the areas of greatest opportunity and will tell them where to go to take advantage of them. They will have the backing of research, development and demonstration work at the Energy Technology Support Unit (ETSU) and the Building Research Energy Conservation Support Unit (BRECSU). They will therefore be able to offer authoritative impartial advice of a very high technical standard. In addition, they will continue their role of catalysing the various elements within their regions to produce a campaign of events to meet regional needs. We hope that the Institute will play a major role in this.

In the domestic sector we are already collaborating closely with the Institute of Energy in the CREATE (Centre for Research, Education and Training in Energy) initiative to include energy in the school syllabus.

These areas of cooperation make sense because the aims of the Institute of Energy and of the EEO are similar in many ways. We both aim to help people understand energy, to realise how important it is and to use it efficiently.

Dr Elliot G Finer
Director General, Energy Efficiency Office

The way forward

As your new president it seems appropriate, in view of our changing circumstances, to review the Institute's position on a regular basis and set out some of the concerns and consequent actions that we all feel are necessary.

In the *Personal viewpoint* column there has been constructive criticism of the Institute's current problems which largely spring from decreasing membership and subsequently, a deficit in the accounts. It should not be overlooked that this is a problem common to many other professional institutions, no doubt arising from the many alternative attractions presented today. Visiting the branches, I can see they have difficulty in getting members to local meetings and a considerable number of members who were recruited at university subsequently leave us. The importance of energy hardly needs to be pointed out but what we do need to remind ourselves of, as indicated by our strategy group, is that the Institute is full of talent, enthusiasm and good ideas. The question of course that needs to be answered is what is being done to put these to good use? Fundamentally we have identified five major issues, namely:

- The best way the Institute should market itself.
- The most effective way the branches can assist in strengthening and revitalising the Institute.
- What aims do we have for the future and what image do we have in the outside world?
- Current views on publications and conferences.
- How should we go about recruiting more members?

Since these issues were identified, the Council, Executive Committee and Strategy Working Group have given a lot of thought to them and now the need is to implement them in a practical way.

Marketing of the Institute is up to each and every one of us. I am endeavouring to make our mark at parliamentary level through the Parliamentary and Scientific Committee and the Parliamentary Group for Energy Studies. We are members of these two groups and have attended on a somewhat irregular basis in the past, I am now trying to correct that and expect that in the future we will be consistent in our attendance. We need, through our new secretary, to keep our profile high in all relevant areas, involve ourselves in sponsorship of exhibitions relating to energy, and provide keynote speakers whenever and wherever the opportunity arises.

The branches are the operating arms of the Institute and it is vital that they are involved in any revitalisation activities. After all, they can communicate with members directly and should be able to identify more readily their wishes and views. Some branches feel that to do this they need better direction from headquarters and that more co-ordination is needed to avoid duplication of effort and people pulling in opposite directions.

Looking to the future, we must not overlook the fact that we are a learned society, and as such must maintain our high standards and address the ever changing energy requirements. The world demand for energy continues to increase and brings with it scientific, social and political problems. As an Institute we should aim to provide an independent view, one of reason and balance, so we need to find some way of speaking out with a united voice. Also in the future we need to broaden the membership base of the Institute and to be on the look out for other groups of people associated with energy who would be anxious and willing to join with us. Finally we must look to students and graduates to join our ranks and to involve them sufficiently to prevent them leaving prematurely. Individual mentors for such young people would, in my opinion, make them feel more wanted and a recruitment campaign would not go amiss.

Our publications are highly regarded but there is some need for change and we are addressing editorial policy and commercial aspects. We would welcome any views that members have about the content and format of any of the publications. Commercially there is a need to get more revenue from sales and advertising within the publications. I feel that there should be more emphasis on local activities but there is a surprising lack of feedback from the branches. I would certainly appreciate much more, we would rather have too much information than too little.

Recruitment of members is a very important issue. It would be beneficial but expensive, to carry out market research and maybe mailshots to various groupings would bring some response. In the meantime we are making closer contact with schools and as I said earlier, a recruitment campaign in universities would not go amiss. I am considering this as an option. Collective membership is a grading that has been much neglected and yet judging from the number of people advertising in the Energy World Yearbook there are many opportunities to expand in this area. Individual members could play their part by tackling companies who would benefit from such membership. I feel strongly that with collective membership we should be able to offer a data bank of information on energy and it is pleasing to see the initiative being taken by the London and Home Counties branch in this field.

I shall see many of you during my presidential year when I visit the branches and I would certainly welcome your news and views either on the correspondence page or directly to the Institute or to me personally.

C E Pugh CBE

Electricity in Canada

Alan Wyatt*

Canada has a diverse mix of electricity generating utilities and facilities. The 10 provinces, plus the Yukon and the Northwest Territories (NWT), are primarily served by eight provincially owned utilities of which one is federally owned, two are municipal (Edmonton and Winnipeg) and four are investor owned. The federally owned utility, the Northern Canada Power Commission (NCPC), was set up to serve the Yukon and the NWT. As of 31 March 1987 the Yukon assets of the NCPC were transferred from the Federal Government to the Yukon Government. These major utilities have nearly 92% of the total installed generating capacity in Canada. Twenty four smaller utilities, about half of which are investor owned and the other half municipally owned, account for 2.1% of capacity. The remaining 6% is owned by over 60 industrial establishments, mainly in the pulp and paper and mining industries. The principal statistics, for the major utilities by province, are shown in Table 1

Over the five years, 1982 to 1986, there were marked fluctuations in the growth of electricity consumption in Canada (Fig 1). The figures for individual provinces showed even larger variations as different parts of the country were hit, with different levels of severity, by the recession of 1981/2 and the recovery that followed. In addition the 1985 ending of various programmes to encourage a switch from oil to electricity slowed this substitution in the residential space heating market. However, by the end of 1986 28% of Canadian households were heated with electricity. There has been little change in end use sector consumption over the previous five years.

The diversity of production by fuel type is shown in Fig 2. Four provinces — Newfoundland, Quebec, Manitoba and British Columbia — have hydroelectric power as their largest source of electricity; three provinces — Alberta, Nova Scotia and Saskatchewan — have coal as their largest source; and two provinces

Table 1: Major electric utility statistics by province, 1985

Province	Assets (Cdn$ millions)	Revenue (Cdn$ millions)	Employees	1986 installed capacity (MW)
Newfoundland	2457	575	2134	7174
PEI	86	64	201	122
Nova Scotia	1414	492	2450	2355
New Brunswick	2870	894	2500	3434
Quebec	29183	4492	18208	27561
Ontario	29320	4625	31166	30406
Manitoba	3261	633	4583	4142
Saskatchewan	2150*	837	3064	2820
Alberta	5585	1423	4687	7598
Brit Columbia	10472	2094	6508	12443
NCPC	276	89	330	313
CANADA	87074	16218	75831	98368

*Includes natural gas operations

*Alan Wyatt is the author of *Electric power challenges and choices* (see review in *Energy World*, May 1987). Before taking up consultancy work Mr Wyatt was head of Advanced Technology, Montreal Engineering

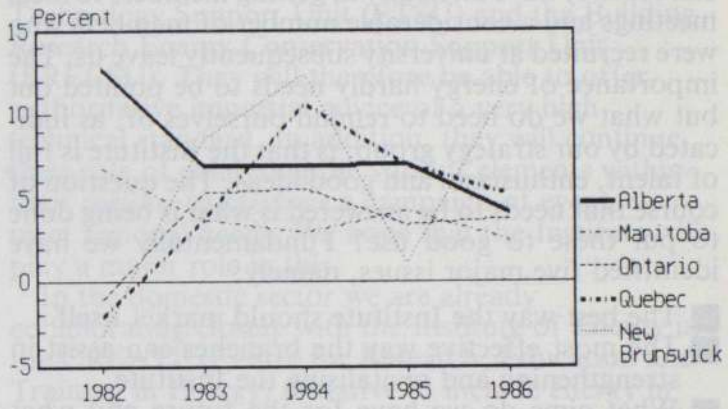


Fig 1: Growth in electricity consumption 1982–1986

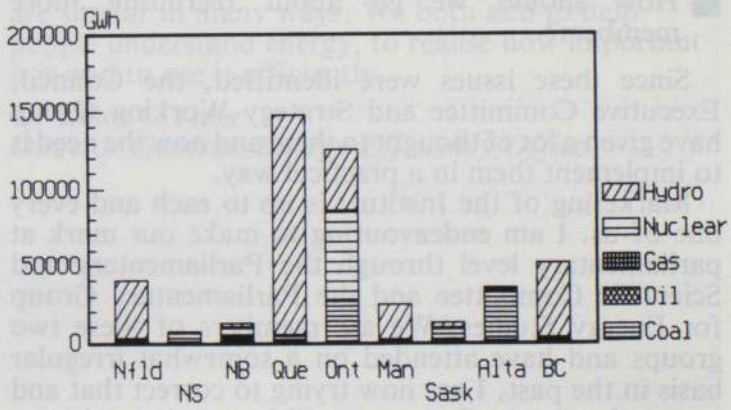


Fig 2: Electricity production by fuel type — 1986

— New Brunswick and Ontario — have nuclear power as their largest source. The smallest province, Prince Edward Island (PEI), gets most of its power through an underwater cable from New Brunswick.

Finally, it is of interest to note the wide differences between the provinces in their reserve margins (defined as the excess of generating capability over peak demand, divided by the peak demand) and their percentage net surplus capacity (defined as the difference between reserve margin and the capacity reserve requirement) (Fig 3). Capacity reserve requirements vary widely from 10% on the predominantly hydroelectric system in Quebec to 23% on the Ontario Hydro system, with its present 16 large nuclear units ranging in size from 540 to 830MW.

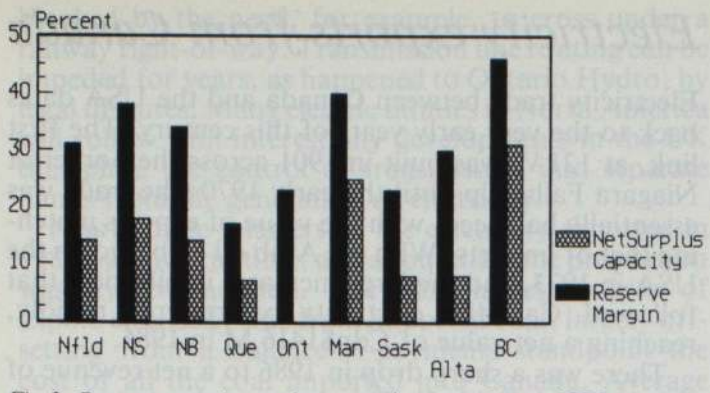


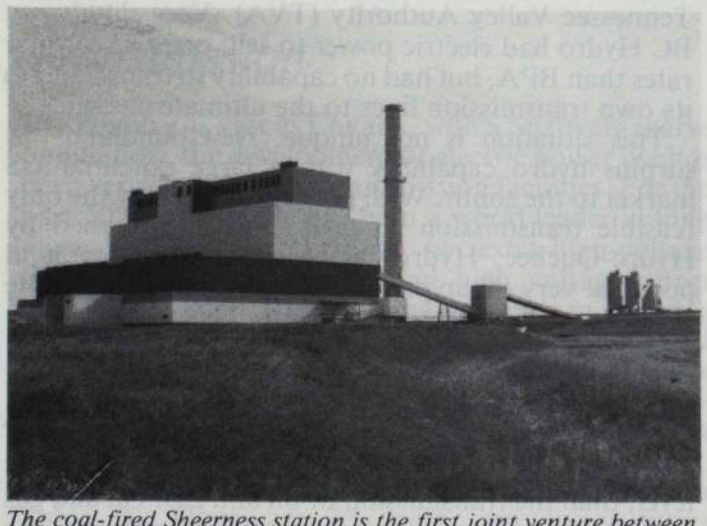
Fig 3: Reserve margins and net surplus capacity — 1986

Canada in relation to world electricity

Canada has less than half the population of the UK but has over 50% more installed electric generating capacity. By any yardstick the Canadian electric utility industry is a major one by international standards, with total assets of about Cdn$90000M. The eight largest national electricity systems are shown in Table 2.

Table 2: Installed generating capacity (MW) — 1985 eight largest national systems

Country	Conventional thermal	Hydro	Nuclear	Total
USA	521503	84397	80100	686000
USSR	215000	61000	29000	305000
Japan	99408	33966	20726	154100
West Germany	74456	6661	16938	98055
Canada	30885	56048	9813	96746
France	27500	22000	37500	87000
China	57840	27160	0	85000
UK	52711	4189	7100	64000
WORLD TOTAL	1609673 (68%)	552144 (23%)	214183 (9%)	2376000 (100%)



The coal-fired Sheerness station is the first joint venture between Alberta's two investor-owned utilities — Alberta Power, which is the managing owner, and TransAlta Utilities Corporation. The station is located near Drumheller and uses surface-mined coal from an adjoining field. The first of two 380MW units is in service and cost Cdn$630 M. The stack is 132 m high. (Photo courtesy of Alberta Power)

Canada is fortunate in having many large hydroelectric projects and ranks third in the world in installed hydro capacity, behind the USA and USSR. It is also sixth in the world with its successful indigenous CANDU heavy water reactor design.

The electricity generation picture is somewhat different. Here Canada was the largest single producer (over 300TWh) of hydroelectricity in the world and accounted for over 15% of total world hydro production. Canada ranked fourth in the world in total electricity generation (Fig 4).

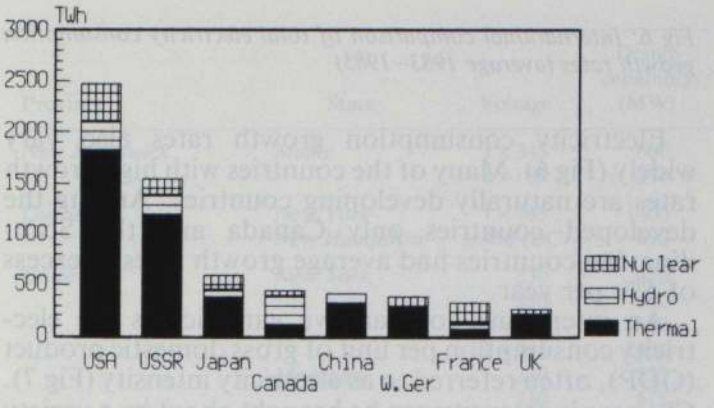


Fig 4: Electricity consumption by fuel type; eight largest national systems — 1986

If average capacity factors are calculated, based on total installed capacity and actual generation, Canada's is exceeded only by China and the USSR, both of which countries have low reserve margins. The combination of a high proportion of generation from hydroelectric and nuclear sources, with a high average capacity factor, is the principal reason for average Canadian electricity rates being among the lowest in the world.

The international picture on *per capita* electricity consumption is somewhat different. The eight countries with the largest installed capacity are widely spread when kWh consumption *per capita* is plotted (Fig 5). Norway has the largest *per capita* consumption of electricity in the world (21950kWh *per capita* in

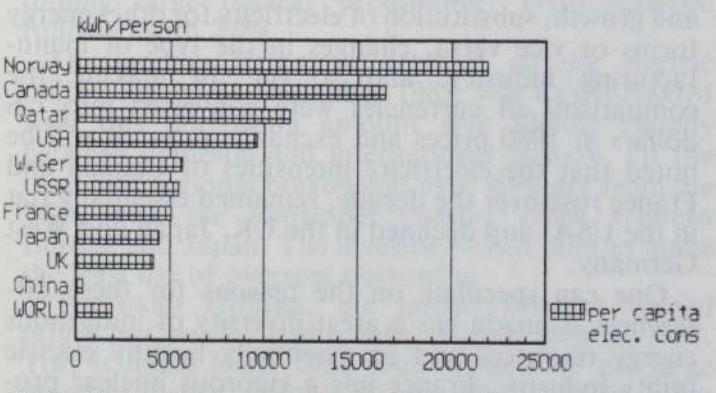


Fig 5: International comparison of per capita *electricity consumption — 1985*

1985). Iceland and Sweden are very closely behind Canada; Luxembourg and Finland fall between Qatar and the USA; while New Zealand, Australia and East Germany lie between the USA and West Germany.

The principal factors underlying Canada's heavy usage of electricity are the space heating demands of a long cold winter and the reliable availability of inexpensive electric power that has encouraged the development of electricity-intensive industries.

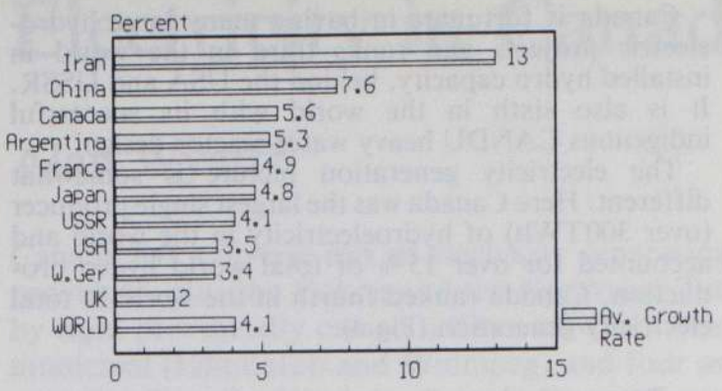


Fig 6: International comparison of total electricity consumption growth rates (average 1983–1985)

Electricity consumption growth rates also vary widely (Fig 6). Many of the countries with high growth rates are naturally developing countries. Among the developed countries only Canada and the Scandinavian countries had average growth rates in excess of 5% per year.

An interesting comparative yardstick is the electricity consumption per unit of gross domestic product (GDP), often referred to as electricity intensity (Fig 7). Changes in intensity can be brought about by a variety

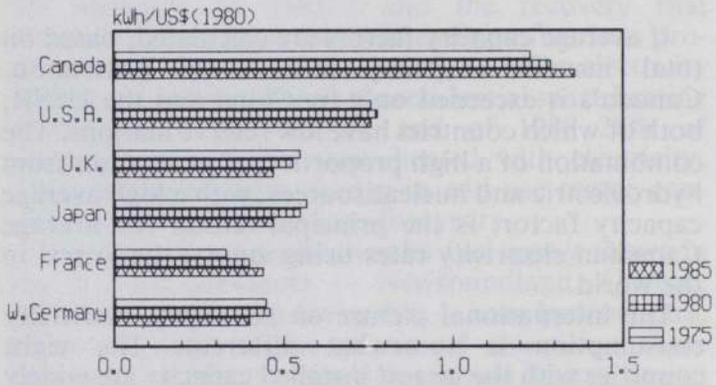


Fig 7: International consumption of electricity intensity (1975–1985)

of factors including conservation, economic recession and growth, substitution of electricity for other energy forms or vice versa, changes in the type of manufacturing industry, and so on. In making the comparison all currencies were converted into US dollars at 1980 prices and exchange rates. It will be noted that the electricity intensities of Canada and France rose over the decade, remained essentially flat in the USA, and declined in the UK, Japan and West Germany.

One can speculate on the reasons for these differences. Canada has a great diversity of indigenous energy resources and an essentially healthy electric utility industry. France has a vigorous nuclear programme which has opened up options. Although the USA also has diverse energy resources it has a stumbling nuclear programme. In comparison the UK, Japan and West Germany have a much more restricted diversity of energy resources.

Although Canada is fortunate in its availability of energy resources this gives the decisionmakers many more options. In these circumstances environmental, economic and technical factors may become outweighed by more purely political considerations, which may not be to the overall benefit of the timely making of the best decision.

Electricity exports from Canada

Electricity trade between Canada and the USA dates back to the very early years of this century. The first link, at 12kV, was built in 1901 across the border at Niagara Falls. Up until the early 1970s the trade was essentially balanced, with the value of exports matching that of imports. With the Arab oil embargo on the USA in 1973, and the large increases in oil prices that followed, Canadian electricity exports grew rapidly, reaching a net value of Cdn$1416 M in 1985.

There was a sharp drop in 1986 to a net revenue of Cdn$1077M (Table 3). This drop was due to two main factors. One was a decrease in the price of oil that

Table 3: Transmission circuit length (km) in Canada — 1986

	100–150kV	150–300kV	300–600kV	600kV and up	Total	%
Newfoundland	1681	2097	—	600	4378	3.8
PEI	168	—	—	—	168	0.1
Nova Scotia	1586	1204	173	—	2963	2.6
New Brunswick	1835	528	969	—	3332	2.9
Quebec	7608	5804	6723	9991	30126	26.4
Ontario	12222	13471	2228	—	27921	24.5
Manitoba	4386	4094	2042	—	10552	9.2
Saskatchewan	3581	2537	—	—	6118	5.4
Alberta	8142	5160	356	—	13658	12.0
British Columbia	4264	4033	5667	—	13964	12.3
Yukon	497	—	—	—	497	0.4
Northwest Territories	503	—	—	—	503	0.4
CANADA	46473 (41%)	38928 (34%)	18158 (16%)	10591 (9%)	114150	100.0

made it economic for some US utility customers to use their own oil-fired generating plant. (The international price of crude oil dropped from US$29 per barrel in 1985 to US$17 per barrel in 1986. The other factor was a problem of access to the main transmission link between British Columbia and the California utilities. Much of that link is owned by the Bonneville Power Administration (BPA), a US Federal Government agency broadly similar to the Tennessee Valley Authority (TVA). Very simply put BC Hydro had electric power to sell, often at cheaper rates than BPA, but had no capability to transmit it on its own transmission lines to the ultimate customer.

This situation is not unique. Newfoundland has surplus hydro capability with a large potential US market to the south. With present technology the only feasible transmission route is over lines owned by Hydro-Quebec. Hydro-Quebec buys Newfoundland power at very cheap prices and sells it, at considerable profit to itself, to New York State, Vermont and New Hampshire.

This type of problem, where the generating utility does not own the transmission system, causes concern to provincial governments. The transmission of electric energy is dealt with differently, at the political level, than the transmission of oil and gas. Oil and gas pipelines are 'common-carriers'. This means that the pipeline operators have to carry oil and gas fed to them by a variety of producers, to a variety of customers, at standard tariffs. Oil and gas pipelines, in Canada, also enjoy the right of 'eminent domain' which, in essence, means that their routing cannot be

blocked by the need, for example, to cross under a railway right-of-way. Transmission line routing can be impeded for years, as happened to Ontario Hydro, by legal disputes. Many electric utilities in North America will follow with interest any developments in the UK that place the control of transmission into separate hands from the generation of electricity.

Nearly three-quarters of the electricity exported in 1986 was interruptible, and about the same proportion was hydro-generated. The next largest source of export electricity was from imported coal, largely offsetting from a balance-of-payments standpoint the cost of all the coal imported into Canada. Average revenue in 1986 from the export of electricity was 3.08 cents (Cdn)/kWh, about a 10% decrease from 1985. The top three exporting provinces in 1986 were Quebec, Manitoba and New Brunswick, with Manitoba climbing to second place from fifth in 1985. However, the proportion of firm power to total exports ranged from 1% in Manitoba to nearly 42% in Ontario. New York State accounted for nearly half the total exports by value, with another 36% going to the New England states. Although Canadian imports to the USA only represented 1.4% of total US electricity demand, they accounted for 12% of New York State's consumption.

Electricity trade is now of great importance to Canada. In 1986 it contributed 14% of the total $7800M merchandise trade balance in that year. Net electricity exports also account for 16% of Canada's total 1986 trade in energy. The fluctuations in energy trade are shown in Fig 8.

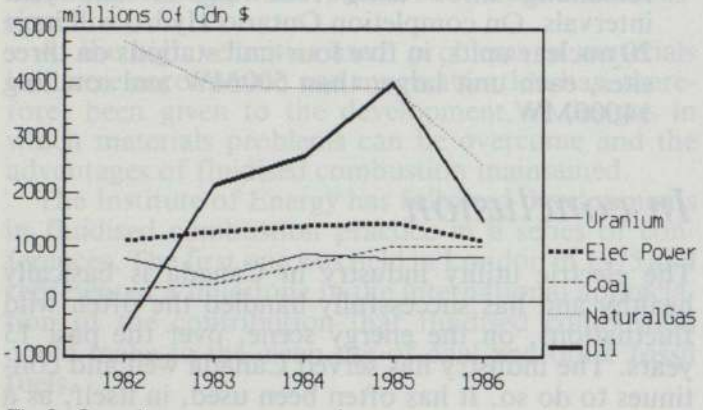


Fig 8: Canadian net energy trade

Transmission

In a country as vast as Canada, with a relatively sparse population, the development of electric power use has been very dependent on transmission facilities. For the past 30 years Canada has been a world leader in long distance transmission, both by extra-high-voltage (EHV) alternating current and high voltage direct current (HVDC). The other major factor in spurring transmission development has been the magnitude and increasing remoteness of the large hydro generation projects. Churchill Falls and James Bay power transmitted over 1000km to reach Montreal and even further to reach down to New York.

The installed transmission circuit length is shown in Table 3. There are 33 major provincial interconnections with a total transfer capability of nearly 10000MW. The major interconnection under construction is a HVDC link between Saskatchewan and Alberta, that will be the final link across Canada between the 10 provinces. The development of 450kV HVDC was pioneered 20 years ago in Manitoba to bring power from the Nelson River generating stations to the southern part of the province.

The electricity trade, described in the previous section, is conducted on over 100 international transmission lines with a total power transfer capacity of 13 600MW. The principal ones, over 300MW, are shown in Table 4.

Table 4: Major interconnections (over 300MW) Canada — US

Province	State	Voltage	Design capability (MW)
New Brunswick	*Maine*	1×345	600
		6× 69	330
Quebec	*New York*	1×765	1400
	New Hampshire	± 450 (DC)	690
Ontario	*New York*	230	470
		230	400
		2×230	600
		2×345	2300
	Michigan	230	535
		230	515
		345	710
		345	760
Manitoba	*Minnesota*	500	1000
British Columbia	*Washington*	230	350
		230	300
		2×500	1400

Utility finances

Investment in the electric utility industry in 1986 amounted to Cdn$6100M (55% generation, 19% distribution, 15% transmission and 11% other). This amount represented 43% of the total capital investment in the energy sector of the Canadian economy, 6% of total capital investment in the economy as a whole and 1.2% of GDP.

Ontario Hydro accounted for nearly half of the total capital investment, primarily due to its continuing large nuclear programme. Hydro-Quebec followed with 27%.

Outstanding long-term debt of all the electric utilities, as of 31 December 1985, was Cdn$62000M with this borrowing amount split almost equally between domestic and international sources. Of the total international borrowings over 90% are from the USA with the remainder coming from Western Europe and Japan. The investor owned utilities make the least use of overseas borrowing.

TransAlta Utilities, the largest investor owned utility in Canada, had a debt ratio of 30% in 1987. This is much lower than that of most of the large investor owned utilities in the USA, which often approach or even exceed 50%. This financial health is also reflected in the fact that dividends paid have doubled in the past seven years.

Interest rates peaked in 1981 at an average of 16.3%, at a time when the consumer price index (CPI) hit 12.5%. Since 1984 the CPI has risen a little over 4% annually and interest rates have come down to around 10.5%.

Average fuel costs varied widely as shown in Table 5 and the average revenue from electricity sales also varies widely across Canada (Table 6). This converts

into wide differences in monthly electricity costs (Table 7). Unlike some parts of the USA, electricity taxes are not a significant factor in Canada. Unlike oil and gas prices the average rise in price of electricity in most parts of Canada, over the past 15 years, has closely paralleled the rise in the CPI, so that the real price of electric power, in constant dollars, has remained relatively stable.

Table 5: Electric power fuel cost (Cdn cents/kWh), 1970–1985

Year	Eastern coal	Western coal	Oil	Natural gas	Uranium	Total fuels
1970	0.36	0.14	0.57	0.25	—	0.33
1975	0.86	0.21	1.29	0.72	—	0.62
1980	1.82	0.38	2.62	1.55	0.26	1.07
1985	2.61	0.66	6.80	3.18	0.47	1.35

Table 6: Average revenue from electricity sales, 1976–1985 (current cents/kWh)

Province	1976	1979	1982	1985
Newfoundland	1.4	2.2	3.6	4.7
PEI	5.1	7.2	12.0	12.9
Nova Scotia	2.8	4.6	5.9	7.3
New Brunswick	2.0	3.7	5.1	5.8
Quebec	1.4	2.0	3.1	3.5
Ontario	1.8	2.6	3.6	4.5
Manitoba	1.7	2.7	2.9	3.6
Saskatchewan	2.1	2.7	4.0	4.8
Alberta	2.4	3.2	4.9	5.4
British Columbia	1.8	2.4	3.8	4.4
Yukon	3.5	4.9	8.3	9.0
NWT	5.2	9.0	14.8	16.3
Canada	1.7	2.5	3.7	4.3

Table 7: Monthly electricity costs — January 1986 selected Canadian cities

Sector billing demand kW consumption kWh	Residential — 1000	Commercial 100 25000	Industrial 1000 400000
St John's	$ 70.01	$1769.98	$22101.29
Charlottetown	117.88	3365.81	48385.70
Halifax	65.72	2047.21	21134.61
Moncton	64.50	2006.30	20450.00
Montreal	40.04	1367.80	15166.00
Toronto	52.89	1262.53	19730.00
Winnipeg	38.35	1013.60	11505.19
Regina	47.26	1497.20	19009.70
Calgary	51.23	1469.26	16963.00
Vancouver	52.38	1308.05	15766.15

Major generation projects

There are a number of major generation projects under construction or planned, across Canada, including:

- Hydroelectric generation shows the most activity, both under construction and planned for construction start within the next 10 years. In the mainland Labrador part of Newfoundland Gull Island (1700 MW) and Muskrat Falls (618 MW) are planned. Major addiitons of 1056 MW at Manic 5 and 1900 MW at La Grade 2 are under construction in Quebec. Construction is proceeding at Limestone on the Nelson River, Manitoba. The first two 128 MW generators are planned to produce power in 1990, with the last of the 10 units completed in 1992. Another station, at Conawapa (1300 MW) also on the Nelson River, is planned. In British Columbia a 900 MW station is planned for a Peace River site.
- Coal-fired station activity is principally centred in Alberta. The second 380 MW unit at Sheerness (pictured on p 5) is scheduled for completion in 1990. The station is jointly owned by Alberta Power and TransAlta Utilities and managed by the former. Two 400 MW units are under construction for the municipally owned Edmonton Power, the first to come into service in 1989 and the second in 1991. Additional new coal-fired units are planned for later service dates in Alberta. Two 280 MW units are planned for Shand in Saskatchewan. There is a possibility that the Hat Creek site may finally be developed in British Columbia. New coal-fired plants are also planned for the mid-1990s in Nova Scotia and New Brunswick.
- Nuclear activity continues to be centred in Ontario. The first of four 880 MW CANDU pressurised heavy water reactors is scheduled to go into service this year at Darlington, with the remaining three units following at one year intervals. On completion Ontario Hydro will have 20 nuclear units, in five four-unit stations on three sites, each unit larger than 500 MW and totalling 14000 MW.

In conclusion

The electric utility industry in Canada is basically healthy and has successfully handled the often wild fluctuations, on the energy scene, over the past 15 years. The industry has served Canada well and continues to do so. It has often been used, in itself, as a major tool in regional development and economic growth. There is still a large amount of hydroelectric power to be developed in some parts of the country, particularly in British Columbia, Manitoba, Newfoundland and Quebec. Alberta and Saskatchewan have plentiful coal supplies near at hand. Canada has abundant uranium and heavy water production facilities for further developoment of its nuclear programme as needed. Its only real problems are making the right energy decisions from an abundance of choices — a fortunate situation indeed.

Acknowledgements

Most of the factual data presented in this paper comes from *Electric power in Canada 1986*, an annual summary prepared by the Electrical Energy Branch of the Energy Commodities Sector of Energy, Mines and Resources Canada, a Canadian Federal Government department. The material was supplemented by data taken from utility annual reports. The photograph was supplied by the electric untility cited in the caption.

Fluidised combustion in practice: clean, versatile, economic?

In organising the fourth international conference we are concentrating on practical experience obtained with all types of fluidised beds as operated by industry. The conference will therefore review the experience obtained in long term operation of fluidised bed equipment, materials performance, flexibility in operation and flexibility in the fuel which can be burnt. Economics and environmental performance are other themes of the conference paying particular attention to the contribution of fluidised bed combustion to the abatement of sulphur and nitrogen oxides, which can contribute to the formation of acid rain.

Fluidisation was first introduced for the combustion of coal as a technique for dealing with high ash and variable coals. It was soon realised that the conditions in a bubbling fluidised bed in which coal was being burnt were well suited to the retention of sulphur dioxide by added limestone. This gave the impetus for the development of a wide variety of combustion equipment based on fluidised combustion.

At the high velocities used, problems of materials loss were encountered and much attention has, therefore, been given to the development of designs in which materials problems can be overcome and the advantages of fluidised combustion maintained.

The Institute of Energy has followed developments in fluidised combustion practice in a series of conferences. The first one was held in London in 1975 and represented a milestone in the international appreciation of the contribution that fluidised combustion could make to the clean use of coal and other fossil fuels.

Since the first conference, fluidised combustion has developed in many different directions; the technology now includes bubbling beds of the 'traditional' type, fast beds and circulating beds in which combustion can be separated from the main heat transfer section. In its various forms, fluidised combustion is being used throughout industry. There are applications for steam generation, drying, process heat, combined heat and power, and for power generation. A variety of fuels can be used including the whole range of coal as well as oil and gas. Some applications make a special feature of being able to accept a wide range of inputs including wastes and low grade fuels. Others have particular design features which enable them to perform to stringent environmental standards.

Although the main theme of the conference is the assessment of fluidised combustion as an established technology, we are also interested in new ideas and in their transfer to industrial applications. The conference therefore provides the opportunity for new concepts to be put forward and for their potential merits to be appraised in comparison with the more mature applications which have already reached the market place.

The conference is being held on 12/13 December at the Scientific Societies' Lecture Theatre in Saville Row, London. For further details contact: Conferences Department, Institute of Energy, 18 Devonshire Street, London W1N 2AU. Tel: 01-580 0008.

J S Harrison (Fellow)
chairman of the organising committee

The Energy Industries Club

The Energy Industries Club is a private luncheon club at which addresses are given by prominent members in the energy and associated industries.

Meetings are held monthly from October to May inclusive (excepting January) at the Connaught Rooms, Great Queen Street, London WC2. The luncheons start 1230 h for 1300 h and the addresses begin about 1400 h and last for about 20 minutes.

Those wishing to make membership, or other enquiries, should apply to the hon secretary: Dr G G Thurlow, Eastcott House, 24 Alexandra Road, Malvern, Worcs; WR14 1HQ. Tel: 06 845 4481.

Members of the Institute of Energy who are not members of the Energy Industries Club are entitled to attend one luncheon meeting at the luncheon price only, with the option of joining the Club for subsequent meetings, at the membership rate.

Fuel rights handbook —a practical guide

Steven Lorber, Stephen Pierce, Ian Tysh, John Wadham and Jane Winter
SHAC/WRUG, 1988
264pp. £5.95

This recently published book is the sixth edition of what was called the *Fuel debts handbook* in 1977. It deals with the ubiquitous subject of energy, in the context of *sociology* and *psychology*, rather than *technology*. It gives a very clear and interesting picture of the relationship between a relatively wealthy and complex democratic state, and those within the state who, through circumstances beyond their control (or possibly in some cases from choice) are unable (or unwilling) to pay in part or in full for the energy that they use.

I must admit that I approached the book with some prejudice, as I believe we all have duties, but doubt very sincerely if we really have any right to claim '*rights*', as opposed to rewards for applied abilities and effort. However, relationships between people, and between individuals and the state are never simple.

Our collective duties to the genuinely disadvantaged, and to those for whom society cannot offer adequate opportunities for self-help, have to be fulfilled. Once this is accepted, the whole basis of assistance has to be codified in order to ensure some degree of equity, and avoid arbitrary and possibly whimsical or sectarian decisions.

Codification leads to legal definitions, and these inevitably lead to confusion on the part of potential recipients of assistance, the majority of whom will have had no training or experience in interpreting legal definitions, and have little understanding of the efficient use of energy, or its true cost.

Energy, in some form, is essential to almost every human activity, including sheer existence in our cold wet winter climate. Cold and hunger are very powerful and dominant experiences, liable to exclude thoughts of prudence, consequences, incurrence of debt, and even 'honesty' as defined by current society.

Right or wrong, our society has decided to provide certain minimal energy needs, and has perforce set up a vast number of rules governing eligibility for assistance. Energy suppliers have to make enormous capital investments and incur high revenue costs (little appreciated or understood by the average consumer) in order to make energy available, and the costs have to be recovered from the consumers. If the consumer cannot pay, then society has had to decide how to make up the shortfall.

Since those in most need are likely to be those least able to ascertain what assistance is available, and to be the least able to make a reasoned case for help, we have a network of organisations, some private, some state, dedicated to providing advice and guidance. These people have a duty to give good, reliable, helpful, legal, and *understandable* counsel in a complex field.

The *Fuel rights handbook* must surely be an *essential* reference book for all concerned with counselling, with administering the billing of customers for any form of energy, with social services, and with the legal aspects of dealing with fraud. But in addition, it is a most enlightening piece of modern social history, which should help the professional, the competent, the comfortably-off, the well-educated, the successful, and the *lucky* members of society, to understand better the problems of others.

The layout is good. The references are extensive. The index does have some quirks — one wonders if a reader would look for 'hard to heat estates'; but 'multi-occupation' is a well used description of potentially troublesome situations which does not appear in the index. Perhaps the seventh edition will warrant a special look at the indexing.

At £5.95, this is surely a 'best buy' for those who can afford it, or alternatively a 'best borrow' from the library.
James P MacCarthy

Soviet oil exports

Margaret Chadwick, David Long and Machiko Nissanke
Oxford University Press, 1987
263pp. £29.50

This report concentrates on the period of the 1970s and 1980s up to and including 1986. As one would expect it contains tables and graphs in profusion.

In spite of having a number of authors it is extremely well written and has many of the characteristics of a detective story. Many technical authors could learn from these authors about presenting difficult material in beautiful English in a way that keeps the reader's interest. It is a fascinating read.

The detective aspect of the book stems from the fact that firm, incontrovertable facts are not available. Deductions have to be made and cross checked against the known information.

Like most aspects of the Soviet Union, the oil industry and the export business is a mixture of laudable achievement and worrying inefficiency. It is restricted by the incapacity of Soviet industry to meet all the demands on it, both for the supply of equipment and the technical advances necessary for the proper exploitation of the oil reserves within Soviet territory.

After an interesting, appetite whetting introduction the first chapter covers oil production, consumption and the relation between them. Of course, Russia was an early pioneer of oil technology and was a major exporter up to the revolution of 1917. The main fields before the Second World War were those in the Caucasus and around the Caspian Sea. The emphasis after the war switched to discoveries in the Urals and more recently in West Siberia which currently produces 60% of the oil production. Reserves are about 10% of the world total and represent 11–14 years production.

Production has increased from 150 Mtpa in 1960 to just over 600 Mtpa, the biggest rate of increase being up to the mid-1970s. Production reached present levels in 1980 and has been level ever since. Bad winter weather means that production falls over the winter months at the time internal demand is greatest.

The main problems of production are related to outdated methods: pumping water into wells to maintain input, turbo-drills and poor quality bits slowing down drilling and machinery breakdowns due to inferior equipment. Policy too has been to concentrate on existing wells and delay drilling and infrastructure work on new fields. The cost of opening new fields has steadily increased and will have to compete with the capital requirements of modernising Soviet industry.

The internal Soviet market for oil is predominantly fuel oil, only 20% is gasoline and this is mostly of very poor quality, predominantly lower than 80 octane (RON). The refineries are relatively inflexible and dominated by production and central planning. However, the system does produce high

quality and low sulphur gas oil and fuel oil that are the major Soviet exports to West Germany and Holland. Apart from Finland, the major West European importers of Soviet crude oil are Italy, Belgium and France. Of these countries only Finland has more than 12% of its oil imports from the Soviet Union. The other major areas taking Soviet oil and Soviet products are Eastern Europe. Virtually no oil goes to Japan or the USA.

The build-up in oil exports to the West corresponds to the plans for extensive industrialisation and modernisation which have run out of steam using internal Soviet resources.

Contracts with importing agencies allow the Soviets to dictate quantity and to negotiate the price basing on equivalent market levels. The exports are seasonal and linked to the requirements of Soviet overseas trade. It appears that the system has enabled the Soviet oil exports to the west to raise the money necessary to cover their essential imports. Oil in the early 1980s provided 70% of Soviet hard currency requirements. Gas exports, although important, are considerably lower.

The book gives an interesting insight into Soviet economic policy and strategy, the forces that are shaping the major changes in the Soviet Union, the oil and energy industries, the purposes of Soviet trade and the factors that limit its flexibility. It is an important book with original research, clearly laid out analysis, reaching well supported conclusions. There is extensive numerical information that ensures that the book is a useful data source as well as a good book to read. Recommended to all engineers with an interest in oil and world affairs.

N G Worley

The Chernobyl disaster

Marko Bojcun and Viktor Haynes
The Hogarth Press, 1988
233pp. £7.95

This book is not for the technical reader who looks for balance, sound technical information and a separation of the authors' opinions and sound facts. There is a good book waiting to be written about the impact of the Chernobyl accident on Soviet society and, in particular the way policy decisions are made in that country on large projects, their safety and environmental impact. Perhaps it is too soon and this is certainly not that book, although it does provide information from Soviet sources not readily accessible to a general reader in Britain.

The authors are well placed to write about Soviet and Ukrainian affairs. One was born there and both work or have studied in university departments of Eastern and Soviet studies.

The first chapter is a short description of the reactor (with some inaccuracies) and the experiment leading to the reactor explosion. Chapter 2, *Firefight*, deals with the reaction and the action taken to deal with the consequences of the incident. Here, the popular press approach of giving quotations from people involved both brings home the impact on individuals but it also seems to reduce the significance of the incident.

The chapter on radioactivity has little new to say except that it gives the useful figure of the radioactive release being 100000 times that of Windscale and millions of times more than that of the 'infamous' Three Mile Island accident: not very surprising as the Windscale releases were filtered and there was no explosion and Three Mile Island was contained. These technical points do not appear in the text.

The chapters that follow cover *Fallout, Kiev, Human heath, Clean up, Ecology, Who is to blame, Unnecessary irradiation* and *Why nuclear power*?

There are interesting chapters on two active groups calling for debate and open discussion on nuclear and other affairs in the Soviet Union, the Trust Group and the Writers' Union. These illustrate that there are opposition groups in the USSR and, even now, the difficulties they experience. There is a short chapter called *Glasnost* that shows, correctly, how far short of free and detailed information the official releases on Chernobyl have been.

N G Worley

Health impact of different energy sources

World Health Organisation, Copenhagen, 1986
71pp. Swfr13

This World Health Organisation (WHO) report was drawn up by a series of committees from Western Europe, USSR, USA and Israel to identify ways in which various forms of energy could have an impact on the health of the general public and workers in the energy industry. The committees were mainly interested in generalised views and considered future trends as well as the current situation.

The value of such a report clearly depends heavily on the experience and knowledge of the teams of experts in the committees. The participants were principally from the field of health and environmental protection with several experts from nuclear energy safety departments. There was a large contingent from the energy safety departments. There was a large contingent from the USA with a wide range of backgrounds: from the US Department of Energy, health and environmental departments, water resources engineering and fluor engineers. There was only one British representative who was from the Department of Health and Social Security.

The coverage of the report is far from exhaustive in any of the fields and is clearly intended to indicate areas where environmental and health activities should be concentrated.

The committees responsible for each section had members from several countries and so there was inevitably a divergence of views. Phrases like 'consensus opinion' are used, for example, in the nuclear section and this suggests that there were dissenters from the report.

The report has a useful bibliography. The references in the areas of nuclear, coal, oil are extensive; those related to 'alternative' sources are limited but those related to conservation draw attention to a number of topics which receive little publicity from energy experts, such as air contaminants in new buildings, CO_2 controlled ventilation, childhood respiratory diseases and nitrogen dioxide, temperature and humidity.

The text of the report covers, presumably, Western Europe although this is not clearly stated. The first section covers energy trends both over the decade 1973–1983 and for the future. For that decade there are figures on the changes introduced by the oil price rises in the period — energy use decreasing by 15%, petrol and oil consumption down, electricity and nuclear up and imports of fossil fuel from the 'East' up. The committee expected coal use to rise together with renewables and some increase in nuclear. Gas use was expected to stagnate or reduce but oil use would decline further, although it should be noted that his opinion was before the price drop in 1986. There are warnings about the validity of the predictions.

The report then considers fossil fuels and health. There is a formidable list of

certain and possible health effects for workers in the field and the general public. Some are the obvious and well known; some are definite, such as skin and eye irritation, motor vehicle and work accidents, while others are potential ones where the evidence is indirect or inferred. These include general effects on mortality and the effects of organic or inorganic pollutants on the human body.

The chapter on nuclear energy is brief. It draws attention to the depth of knowledge and regulation by international bodies and the fact that for these low levels of radiation there are no scientific data to justify any public concern. The only effect quoted is an increase in the incidence of cancer in uranium miners who smoke and there are not many of those in Western Europe.

A chapter on renewables follows. Hydropower is widespread in Western Europe and there is a list of environmental as well as health and injury hazards. The solar section spotlights the problems with satellites beaming microwaves to earth with exposure to low levels of microwaves and the health problems associated with large-scale use of materials like silicon, cadmium and arsenic. Other sections deal with ocean and tidal, geothermal and biomass.

These then are thoughts on the future, international cooperation and conclusions and recommendations. These include an increase in WHO work on energy related health topics, sponsorship of meetings on energy and health review of measures to protect health and epidemiological monitoring, monitoring of exposures to 'physical and chemical agents'.

On policy matters the committee supports conservation, reservation of gas for small scale users and coal used only in large scale plant with effective monitoring and control, mass transport rather than individual vehicles — all rather different from the 'market forces' emphasis and preservation policies in Britain.

There is a matrix on the health effects of the stages in energy use from exploration and extraction to waste disposal and decommissioning. Some of the entries in this appear somewhat surprising particularly the nuclear ones. For example, the entry indicating genetic effects of accidents in nuclear fuel reprocessing and preparation amounts to 'several thousands a year' over Europe. Hydro which I believe is responsible for many accidents from construction failures emerges with a virtually clean bill of health.

An uneven review that has some points of interest to energy engineers but lacks depth and background data.

N G Worley

Biomass for energy and industry — 4th EC conference

Edited by: G Grassi, B Delmon, J F Molle and H Zibetta
Elsevier Applied Science, 1987
1391pp. £95.00

How does one start to review the published proceedings of a conference containing over 1300 pages? One would certainly expect quality output from a conference as prestigious as this one but do quality and quantity necessarily coincide? Looking at the allocation of space in the book one sees that about 460 pages are devoted to the main conference sessions with just over 900 pages devoted to the poster sessions. This is the natural outcome of such a notable conference, the number of papers submitted far exceeds the number which can be presented in the time available. Should then, the poster sessions be reported in the proceedings? It seems that this review must, of necessity, also be a review of the conference and of the general method of publishing proceedings as well as of this book.

A quick examination of the section titles suggests that the theme of the conference covered many aspects of biomass — forestry, other biomass crops and harvesting; biological and thermochemical conversion; agro energy and agro industrial systems; tests and trials.

From this, one can only dip into some of these aspects. Before embarking on this your reviewer recalls a criticism made by a team of management consultants of a firm for which he once worked: 'The number and size of documents sent to many people in the firm means that they must spend most of their time reading them and doing very little else!' Enough said! Verbal (and paper) diarrhoea is one of the sins of the current age of information processing.

Biomass materials grown for energy or industrial feedstock can range from annual crops (sunflower, rape) to long term rotation (trees). Other biomass materials can include crop residues (straw, for example), human and animal waste and some industrial waste. Processes for utilisation of biomass for energy include biological methods (digestion, fermentation), thermochemical (pyrolysis, gasification) and simple combustion.

Materials grown for energy may compete for land with food crops or timber production although there is spare capacity as far as food is concerned in the western world. Land converted for energy use would have socio-economic effects on land-owners and workers and, possibly, environmental effects.

However the bottom line must be the cost of fuel or energy from these biomass alternatives compared with conventional sources or other alternatives. How did the conference address these matters?

The section on production and recovery of biomass crops dealt with problems on an agricultural basis. Yields of different species, effects of fertilisers, quality of land being used — all these were discussed. There is considerable information for Europe and North America on different trees and shrubs. However, hardly anywhere does one see the yield quoted in energy terms (J/m^2) or energy cost (£/J). It is a pity that the various workers involved with alternative energy are not compelled to indicate the energy costs, if only to remind readers. One striking comment was in a conclusion on the use of land for biomass production: 'Significant biological, economic and social benefits are suggested for agro-forestry. However, many of these suggestions lack experimental evidence, despite the proven utility of agro-forestry in southern Europe'.

Conversion processes both biological and thermochemical are similarly covered: anaerobic digestion of sludges, fermentation, pyrolysis, hydrogasification, refuse derived fuel. In many cases performance measures were given (for example, 0.9 litre biogas $litre^{-1}$ dig d^{-1}) but not to a consistent scale. However, one paper particularly deserves mention — *Costs of biomass conversion* by A V Bridgwater in which capital and operating costs of existing converters were surveyed. This also led to an important conclusion: 'The rate and extent of implementation (of thermochemical conversion) is essentially an economic problem of matching or beating energy market prices. A perceived major problem is the imperfect match between market requirements and technological capability, which is currently bridged by promises or hopes, and requires resolution'. Once again a criticism that the users of biomass energy are being taken along with unreliable evidence. Entrepreneurs who want to break into the field — beware.

The conference, as described by the book, certainly covered the important

areas in the field of biomass for energy with possibly enough industrial involvement to justify the word 'industry' being included in the title. Delegates to the conference would have benefited from the wide range of papers and posters. But is this the test of the book of the conference? Surely for people not attending the conference, workers starting in the field for example, the book would need to be more succinct. There appear to be no keynote addresses, or they were in French. This is either a criticism of the conference or its presentation in the book.

It is unclear whether this book has a role to play but this comment applies to all major conference proceedings. Books are expensive to buy and better filtering (editing) is needed to produce something worthy of the price. A warning to all conference editors.

R G Herapath

The yearbook of the Coke Oven Manager's Association 1987

COMA (Yearbooks), 1987
296pp.

This is the 68th issue of the COMA yearbook, which remains an extremely useful reference book. Mr Williams, president of COMA, in his presidential address described the effects of the recent UK recession on coke-making capacity. He thought that the closure of plant and reduction of production had made the coke oven manager something of an endangered species, and that the halcyon days that the industry had enjoyed during the 1960s and 1970s would never return.

In spite of the changed circumstances, the industry has remained resilient and has pursued the aim of producing coke of consistent quality at low costs, cleanly and safely. This is reflected in the series of papers which are reproduced in the yearbook.

A series of papers are included that describe the experience of coke oven managers during the 1984/85 miners' strike. Each of the plants (Bedwas, Cwm, Llanwern, Nantgarw, the Phurnacite Batteries, Orgreave, Dawes Lane and Monkton) encountered a range of problems, and following the restriction of coal deliveries most were forced to cease producing coke and maintain the ovens empty but on heat using natural gas. It is a tribute to the staff that during the 12 month dispute the plant survived without any significant damage being sustained to the plant. However, operators such as British Steel have explored and established new sources of coal, they have also evaluated the benefits to the iron-making process of using coke made from better quality imported coal.

The yearbook contains several other important papers, principally a reprint of the 18th Carbonisation Science Lecture, *Constitution and monitoring of coking coal blends*, delivered by Dr A Poos (Centre de Recherches Metallurgiques, Belgium).

Other papers cover a wide range of topics, such as *The role of coke in a modern blast furnace* (Hanniker and Hartley); *Fluidised bed coal gasification* (Green *et al*); *The world's largest coke oven battery* (Durselen, Allen and Schulte); *Tar distillation today* (Bradley); *Alkalis and the high temperature stability of coke* (Goleczka and Tucker) and *Towards good battery heating* (Vander).

My only negative comment on this excellent publication is the style of presentation. I hope the editorial committee will consider changing the antediluvian format to reflect the 1980s hi-tech content.

Andrew W Cox

Mineral impurities in coal combustion — behaviour, problems and remedial measures

E Raask
Hemisphere Publishing, New York, 1985
484pp.

The author in the preface of his book sets out his objectives of this book. The principal aim is to provide information on the boiler operation problems associated with mineral matter in coal. He goes on to say that this would assist the plant design and operational engineers to produce electricity from coal with maximum efficiency. The author achieves his objectives very satisfactorily indeed.

While the role of mineral matter in coal has been researched over the years with respect to the various problems it poses for its conversion to electrical energy, this is probably the first most comprehensive book that addresses all these problems and recommends suitable guidelines. Starting with the nature of minerals present in coal and their effects on its utilisation are treated very systematically.

This book will prove to be a standard text book for students, practising fuel technologists, operators and coal suppliers alike. Eric Raask has been a well known figure in this field for a long time. He has put the results of his years of research work into this book. To quote the concluding paragraph of the Foreword by Bill Reid: 'Texts of this scope and this wide coverage on this important subject are few indeed. This one will serve well for many years'. Very true.

Dr A Sanyal

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CEGB
Privatisation timetable 'tight'

Lord Marshall, chairman of the CEGB, described last year as 'a dramatic year' for the Generating Board when he presented the CEGB's annual report and accounts.

In reviewing the highlights of the CEGB's activities during the last financial year Lord Marshall said that despite a mild winter sales were up again by 2.7% to a record of more than 239000M units and demand had risen by 3.7% on a weather corrected basis. However, last year, mainly because of higher than expected nuclear fuel cycle costs, the financial return was below target at 2.3% on a current cost accountancy basis. Lord Marshall pointed out that most organisations measured their performance on a historical cost basis. On this basis, the CEGB earned a 9.8% return before interest.

On privatisation Lord Marshall said: 'The Government has set a tight timetable with legislation due before Parliament this autumn and, if things go as planned, Royal Assent next summer. Vesting Day, when the successor companies formally take over from the CEGB and the area boards, is planned for 1 January 1990. Flotations should follow in the following two years. It is clear to us that this timetable is only credible if we take action to anticipate the legislation. We, therefore, propose to divide up the CEGB into three shadow organisations which anticipate the new companies. We intend to establish these shadow companies in January 1989, 12 months before the formal Vesting Day so we can gain experience of how the new structure will work.

'It is, of course, not possible to split an organisation in the abstract. We first needed to know the senior management of the organisations concerned and thus welcomed the announcement of the appointment of the chairmen and chief executives of the CEGB's three successor companies.'

Earlier this year it was announced that Lord Marshall and John Baker would take up the posts of chairman and chief executive respectively of Big G. Bob Malpas, currently managing director of BP, and Ed Wallis as chairman and chief executive of Little G. The Transmission Company (Transco) will be run by David Jefferies and Bill Kerss.

Power stations have been allocated to each company. The allocations are:
Big G: Aberhthaw, Acton Lane, Agecroft, Barking, Belvedere, Berkeley, Blyth, Bold, Bradwell, Carmarthen Bay, Cliff Quay, Cowes, Cwm Dyli, Denver, Didcot, Dolgarrog, Drax, Druridge, Dungeness A and B, Eastbourne, Eggborough, Elstow, Fawley, Hartlepool, Heysham 1 and 2, Hinkley Point A and B, Ironbridge, Killingholme, Letchworth, Lister Drive, Little Barford, Littlebrook, Maentwrog, Mary Tavy group, Meaford, Nechells, Northfleet, Norwich, Ocker Hill, Oldbury, Padiham, Pembroke, Poole, Portskewett, Rugeley, Sizewell A and B, Skelton Grange, Staythorpe, Stella North, Stella South, Thorpe Marsh, Tilbury, Trawsfynydd, Uskmouth, Wakefield, West Burton, West Ham, West Thurrock, Willington, Wylfa.

Little G: Ashford, Blackburn, Blackburn Meadows, Bull's Bridge, Carrington, Castle Donington, Cottam, Drakelow, Dunston, Elland, Ferrybridge, Fiddler's Ferry, Grain, Hams Hall, Hastings, High Marnham, Ince, Inswork Point, Kingsnorth, Leicester, Marchwood, Plymouth, Ratcliffe, Rheidol, Richborough, Rye House, South Denes, Taylor's Lane, Watford, Wigsley.

Transco: Dinorwig and Ffestiniog.
Source: CEGB

Heysham 2
Produces power

The CEGB's newest nuclear power station, Heysham 2 in Lancashire, began supplying electricity to the national transmission grid in July. The 660MW turbine generator powered by the station's first advanced gas-cooled reactor was 'switched on' by Gil Blackman, deputy chairman of the CEGB.

When the turbine produces 400MW the board will apply to the Nuclear Installations Inspectorate to take the unit up to its full load of 660MW for the winter.
Source: CEGB

UKAEA
More non-nuclear work

The 1987/88 annual report of the United Kingdom Atomic Energy Authority confirms that the authority is to undergo a slimming down process.

One of the Authority laboratories, Springfields, is being phased down, the size of its headquarters will be halved, and reviews of its engineering and computing activities are underway. Since the report went to press, a major reduction of its fast reactor R&D is also foreseen following the recent Government decision.

In announcing the publication of the report the authority's chairman, John Collier, emphasised a drive to market R&D services. He said: 'I attach the highest priority to reducing our present over-dependence on our three traditional nuclear customers, the Department of Energy, the electricity supply industry and BNFL, by finding new markets and new customers, both in the UK and overseas. Our non-nuclear business is now growing at around 10% per year, and while that in itself represents a considerable achievement it is not enough. A new business development team has therefore been taking a number of other initiatives together with staff from our establishments. We are entering these non-nuclear markets under a new banner — AEA Technology.'

In its second year as a trading fund, the UKAEA has found it a harder task to achieve its income budgets and profit target than before. Nevertheless a current cost operating profit of £13.1M (1986/87 £12.5M) was achieved before allowing for interest and for the provision as an exceptional item of £20M for costs arising from the Springfields phasing down. The financial implications of this are still being discussed with the Department of Energy. Turnover in the year was £428.6M.
Source: UKAEA

Committee conclusion
'Naive' say major oil company

The Trade and Industry committee report conclusion that there is *prima facie* evidence of resale price maintenance in the United Kingdom petrol retail market has been rejected by Texaco.

The company says that the fact is that the return on investment for the United Kingdom petrol retail industry in the 1980s has been minimal and even negative in some periods. It has been worse than that of almost any other high street retailer. For the committee to suggest that oil companies have been colluding on price is therefore to suggest that we have been colluding is masochism.

The committee makes particular play on product exchanges and expresses surprise that they exist. Texaco describes this as 'naive'; there is no secret that product exchanges have been in existence for over 30 years for

the financial benefit of the end consumer. It is one of the reasons why a gallon of petrol is still cheaper than a gallon of milk or table water.
Source: Texaco

CHP
New forum for the industry

Britain's major combined heat and power (CHP) development companies have launched a new forum. Chaired by Bill Houston, managing director of BP Energy, and organised by the Combined Heat and Power Association, the Industrial Forum will enable the CHP industry to respond to the challenges of electricity privatisation.

The CHPA is keen to ensure that CHP developers get a fair deal in the post privatisation electricity market. Industry, the Association says, can then get the benefits of on-site production of heat and power — potentially with the scope for income generating electricity sales.
Source: CHPA

SELCHP
A new consortium too

The London Boroughs of Greenwich, Lewisham and Southwark have joined forces with a number of commercial organisations and the electricity supply industry to form the South East London Combined Heat and Power Consortium.

The consortium has been formed to investigate the feasibility of combined heat and power in the area based on incineration of domestic refuse. It will therefore be furthering the work started by the former Greater London Council and continued by the boroughs as the South East London Waste Disposal Group.

Studies previously undertaken by consultants indicate that a refuse-fired combined heat and power plant is an economically viable alternative to refuse disposal by landfill. Heat recovered from the incineration process will be available to generate electricity, supply hot water for space heating and steam to large industrial users.

The incineration plant, capable of burning a minimum of 300000t of waste/year, will be designed to be more environmentally acceptable than existing landfill disposal arrangements.

A survey will be made of the potential heat market, bearing in mind economic and environmental considerations and community benefits, concentrating on local authority housing and the larger industrial and commercial users.

The initial programme of work is scheduled to take nine months and will culminate in the publication of a report on the viability of the project and the preferred site.

In the event that an economically-viable scheme is identified, the consortium would then form a limited company to implement the scheme.
Source: South East London Combined Heat and Power Consortium

Radioactive waste
Mixed news

A report published in August said that there had been improvements in radioactive waste disposal but doubts remained on long-term issues. Some aspects of radioactive waste policy were described in the report as 'confused or deficient', despite growing technical knowledge.

Prof John Knill, chairman of the Radioactive Waste Management Advisory Committee, presented RWMAC's Ninth Annual Report and said: 'The nuclear industry and its regulating authorities were continuing to make advances in their management of radioactive waste disposal, although there remain doubts on a number of issues'.

The report said that there was uncertainty about the location of a deep disposal site for low and intermediate level radioactive waste but commends Nirex, the organisation with the task of finding a site, for its 'workmanlike and open approach'. The report also records RWMAC's concern that the low-level radioactive waste site at Drigg could be filled to capacity by the end of the century, well before the deep disposal site will be available.
Source: Radioactive Waste Management Advisory Committee

Robots . . .
. . . for safer nuclear plant

Plans to build robots to seek out and mend radioactive leaks, and to find safer ways of decommissioning nuclear power stations are included in a £308M package of cross-frontier research projects tabled by the European Commission reports the *Financial Times*.

More than half the money would go on a greatly expanded second phase of a popular programme to help students in technology-related subjects study in universities or undertake industrial training in other member states. Some 2500 students have taken part in the current phase.
Source: Financial Times

Home insulation
Grants increased

The maximum level of grant under the Government's Homes Insulation Scheme has been increased from £137 to £144.

Marion Roe, Parliamentary Under Secretary at the Department of the Environment who said the increase applied to England, Scotland and Wales, also announced a revised schedule of insulation materials approved for grant purposes.

In reply to a written parliamentary question from Nigel Forman, MP (Carshalton & Wallington), Mrs Roe said: 'An amendment to the Homes Insulation Scheme has today been laid before Parliament which increases the maximum grant payable under the scheme. Householders in eligible dwellings in receipt of Housing Benefit, Income Support or Family Credit can thus qualify for grant towards the cost of loft insulation of 90% of the cost of works up to the new maximum amount of £144. The increase should enable those on lower incomes to continue to afford loft insulation and derive benefits in terms of energy savings or increased warmth. The amendment to the scheme which includes a revised schedule of materials approved for grant purposes, applies to England, Scotland and Wales.'
Source: Department of the Environment

British Standards
For energy efficiency

A new code of practice for energy efficient refurbishment of housing has been published by the British Standards Institution (BSI).

Part 1 of BS 8211 gives recommendations for achieving energy efficient and economical design in the renovation or improvement of existing housing. The code provides guidelines on adequate air and surface temperatures, adequate air quality and minimum levels of ventilation and thermal insulation. It also looks at heating, hot water and lighting, as well as condensation problems.

Copies of Part 1 of BS 8211 may be obtained from BSI Sales, Linford Wood, Milton Keynes MK14 6LE. Price: £28.50 (£14.25 to BSI subscribing members).
Source: BSI

and hot water

A full technical revision of code of practice CP 341 has been undertaken and published in three Parts as BS 6880: *Code of Practice for low tem-*

perature hot water heating systems of output greater than 45 kW.

The new standard is intended to provide a source of information on all aspects of low temperature hot water systems, together with comprehensive cross referencing to more detailed specific publications. In addition the revision encompasses modern heating systems such as heat pumps, and deals with automatic control.

Part 1: Fundamental and design considerations gives recommendations regarding the fundamental considerations and the design considerations which need to be taken into account in the design of low temperature hot water heating systems of output greater than 45 kW, open vented or sealed.

Part 2: Selection of equipment gives recommendations concerning the selection of the principal items of equipment associated with the utilisation, distribution, energy conversion and control subsystems.

Part 3: Installation, commissioning and maintenance deals in a similar manner with the installation of equipment including associated pipework installations, thermal insulation and electrical work.

While the recommendations made in the code generally relate to common practice, they are not intended to inhibit the use of innovative systems or equipment which an experienced designer considers appropriate to the application, and which meet all statutory requirements and the safety and general good practice recommendations of the code.

Copies of BS 6880 may be obtained from BSI Sales, Linford Wood, Milton Keynes MK14 6LE. Price: parts 1 and 2 £41.00 each (£16.40 each to BSI subscribing members), part 3 £25.60 (£10.24 to BSI subscribing members).
Source: BSI

Energy in 1987 Production was down

The 1988 Digest of United Kingdom Energy Statistics was published in August. Primary fuel production in the UK in 1987, equivalent to 405.3 Mt of coal, was 2.1% less than in 1986. Coal production, at 104.4 Mt, was 3.4% lower, and crude oil production, at 123.3 Mt, was 2.9% less than in 1986. Natural gas production was 17.3 billion therms, an increase of 4.7%. North Sea oil and gas accounted for over 68% of total primary fuel production.

Demand for primary energy in the UK last year, equivalent to 338.1 Mt of coal, was about 17% below the level of primary fuel production. Demand was one per cent higher than in the previous year (1.6% higher after correction for temperature differences), but still five per cent lower than in 1979, the year of peak total energy consumption. When non-energy uses of fuels (petrochemical feedstocks, lubricants and so on) are included, the net surplus of production in 1987 was just over 14%, reflecting movements in net exports, stock changes and marine bunkers.

The Digest is available from HMSO at a cost of £13.50.
Source: Department of Energy

New drilling centre For Aberdeen

A new International Drilling and Downhole Technology Centre will be based in Aberdeen. The total cost of the development will be £8.7 M.

The aim of the centre is to provide an independent facility where oil supply and service companies can develop, test and demonstrate new drilling and downhole techniques. It will be situated at a site adjacent to the Aberdeen Exhibition and Conference Centre at the Bridge of Don and will house three wells and provide companies with the opportunity to test and develop equipment without having to interrupt production work being carried out offshore.
Source: Scottish Development Agency

Australian Cash for coal research

The Australian Government has announced research grants totalling Aus$11.05 M for 38 projects to improve the competitiveness and safety of Australia's coal industry.

Some of the larger grants include:

- Aus$1 165 400 to the Queensland Coal Association to evaluate a longwall mining system for extraction of underground coal seams up to 6m thick.
- Aus$1 133 684 to the Australian Coal Industry Research Laboratories for projects investigating the use of radar and radio imaging to detect faults in coal seams.
- Aus $517 000 to White Industries for demonstration of a chemical cleaning process developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) which provides coal of a very low mineral content to replace oil.
- Aus $395 894 to CSIRO to develop and test instruments aimed at improving control of coal-fired power stations.
- Aus $316 339 to Control Systems Technology Proprietary to develop a compact gas monitor to be used either as a personal safety device or as the basis of a mine-wide monitoring system.
- Aus $293 263 to CSIRO to develop Korean Yontan-style coal briquettes, using Australian coals, which would open up new opportunities for Australia's coal industry to service local and overseas demand for coal composite fuels.

The grants have been made under the National Energy Research, Development and Demonstration Programme, the Government's main avenue for encouraging energy research and development.

Announcing the grants the Minister for Resources, Senator Peter Cook, said they also covered projects for improving mine ventilation, mine operations training, explosives and rescue.
Source: Australian News Service

Cragside The first hydroelectric house

The Japanese Ambassador, Mr Kazuo Chiba, opened the 'Power Circuit' Energy Trail at Cragside, the National Trust owned property near Rothbury, Northumberland, the first house in the world to be lit by hydroelectricity.

The Cragside power circuit was developed by William George Armstrong (later, Lord Armstrong) the leading Victorian scientist and industrialist. Armstrong created Cragside not as a country retreat, but as a large scale open-air laboratory for his work on energy technology.

Now for the first time in over 50 years, visitors can see the fully restored hydraulic and hydroelectric machinery installed by Armstrong between 1869 and 1900 within the original buildings that housed them along the course of the Debdon Burn.

In order to preserve the Armstrong legacy an appeal for £400 000 has been launched to help create the Cragside Science and Technology Project. The project will cost in the region of £520 000 to create, maintain and develop, this is in addition to the £3 M that the National Trust has invested in the restoration of the house itself and the 900 acres of wooded grounds owned by the Trust.

The second phase of the appeal with a target of £400 000 is a good opportunity for companies to sponsor a project that will help to raise the profile of the North East.

For more information contact the appeal's director Mrs Elizabeth Anderson, Cragside, Rothbury, Morpeth, Northumberland. Tel: (0669) 20068.
Source: National Trust

New members

Fellow

Derek Edwin Riley, Land Combustion, Dronfield (*transfer*)
Peter Wong, Modern Terminals, Kowloon, Hong Kong (*transfer*)

Member

Robert David Eden, Summerleaze Ltd, Maidenhead, Berkshire (*transfer*)
James Thomas Edmundson, British Steel Corp, Port Talbot (*transfer*)
Robert George Garwood, British Gas, Bishops Stortford, Herts
Mark James Izard, Baltimore Aircoil, Italy (*transfer*)
Alan Richard Johnson, Metropolitan Police, London
Robert Loudon, Rendel Hancox, Glasgow
James Stewart MacDonald, Rendel Hancox, Glasgow
Graham Paul Wenden, Cooper Energy Services Intl, Surrey

Associate Member

Tony Stretton, CEGB, Ferrybridge Power Station, West Yorkshire
Roger Galbraith Gerrish, British Gas, Cardiff

Graduate

Adrian Nicholas Carter, DMS Energy, Long Eaton, Notts.
Chris Gibson, Ewbank Preece, Brighton, East Sussex
Andrew Thorne, Bedford General Hospital, Bedfordshire

A new engineering degree

A new honours degree reflecting the needs of industry for a greater number of broadly-based Chartered Engineers has been suggested by the Engineering Council. The proposed scheme will also widen access to engineering degrees without lowering standards, it says in a consultative document entitled *An integrated engineering degree programme* (IEDP).

At a time when the rapidly-changing industrial climate is dominated by technological advance, some employers need to have available a larger pool of graduates who have followed a multi-discipline integrated course. After graduation these broadly educated engineers can then be turned rapidly into specialists of the employer's choice. There are employers who claim, rightly to have the capacity to teach specialisms quickly, with the inclusion of the very latest technology, and engineering students now have to be prepared for both a specialised and a wider role.

Good employers will know that career progression for these young graduates will include a number of appointments, some specialist, others of a more general nature, and that it is important to give them early responsibility to ensure that the horizons of their bright young men and women are broadened in employment.

On the understanding that industry will take the more enlightened view and give appropriate training and early responsibility to graduates, employers have certain valid expectations of engineering degree courses, says the document. These expectations are directed towards giving the students a true image of an engineer in industry, including the engineer: as an authority on technology, a leader of others, a communicator.

The purpose of the Integrated Engineering approach would be:

- to reflect the fact that the first job destination of graduates is often unclear and job opportunities at entry to a degree course may change markedly by the time of graduation, as may the aspirations of the students.
- to emphasise the interdisciplinary nature of engineering activity.
- to make a career in engineering more accessible, by means of suitable course design, to those without all the traditional, formal qualifications.

There is a steep downward trend in the number of 18-year-olds between now and the mid-nineties, the Council points out. Not only is it necessary to ensure that all engineering courses are up-to-date and attractive to students but also that access is opened to more young men and women by the creation of new types of course that maintain standards but that may approach the employment and teaching problems from a fresh standpoint.

A report by a curriculum working party, funded by the Department of Trade and Industry, was set up to test the feasibility of the scheme. It is being published separately to guide those university and polytechnic engineering departments who may wish to mount pilot schemes within the integrated engineering degree programmes. Some pilot schemes will start in 1989.

The Engineering Council says that courses of the kind advocated contain sufficient engineering of honours level to qualify for accreditation towards Chartered Engineer, even if there is not enough of any one engineering discipline to satisfy all the customary requirements for each engineering institution. There is a need for the engineering institutions to operate in such a manner to enable them to accredit, either singly or in concert, this type of course.

Responses to this consultative document are sought from all organisations and individuals having an interest in engineering education. Copies are available, free from the Engineering Council, 10 Maltravers Street, London WC2R 3ER. Tel: 01-240 7891.

Personal

Chris Corbin (Virgo (Engineers) Brighton) has been elected president for 1988–89 of the Heating and Ventilating Contractors' Association. He succeeds John Beresford.

Prof Cyril Hilsum FEng FRS has been elected president of the Institute of Physics for a two year term starting on 1 October 1988. Prof Hilsum is director of Research at the GEC Hirst Research Laboratories, Wembley.

Richard Tinson, managing director of Emstar since its launch in 1984, has been appointed chairman of the company. **John Ashcroft,** previously marketing and sales director, takes up the position of managing director.

Institute of Energy *1988 Branch conference*

North-Eastern

12 Oct (W). One-day energy conference and exhibition: *Energy efficiency in buildings.* Civic Centre, Newcastle upon Tyne. Contact M G Burbage-Atter on (0642) 218121.

Annual general meeting

Economy and the future were the themes of the Institute of Energy's 61st annual general meeting, held at 18 Devonshire Street, London W1 on 26 May 1988.

The honorary treasurer, P C Warner, in his statement to the meeting pointed to the fact that in 1984 the Institute's accounts showed a surplus of £36 000; since then, however, the position had deteriorated and the accounts for 1988 showed a deficit of £32 500. This was marginally up on the 1986 figure but it was clear that positive action was needed.

Mr Warner said that in order to tighten the Institute's budgeting procedures committee chairmen and senior Institute staff had been made more accountable for their expenditure and a cost centre system had been introduced. Mr Warner was concerned that the real cost of events such as conferences should be known and, to this end, new conference budgeting guidelines had been drawn up that would ensure that staff time was charged to each conference.

In order to help staff administer the new accounting procedures a new computer system had been purchased.

The budget for 1988 was the first that had been set out using the new guidelines and Mr Warner said that he hoped the deficit could be cut to £7000 for 1988 as a result.

On the Institute's reserves, Mr Warner said that the picture was brighter; the reserves stood at about £378 000. Obviously if the financial situation did not improve then the reserves would gradually be depleted. The reserves, it was agreed, should be used to create a firm base for the Institute.

During the year it had been decided that the Institute's investment advisers, Hill Samuel, were too big a company for the Institute of Energy; the Institute's business was very small in comparison with the company's other clients. After a survey of investment advisers a company called Singer and Friedlander, with clients ranging from the very big to the very small, had been engaged. It was felt that the Institute would receive a more personal service from the new company.

Mr Warner was asked about the value of 18 Devonshire Street. The lease would expire in 2008 and with property prices rising the reserves would not be sufficient to provide new accommodation at the end of the lease. Mr Warner replied that opinions on the subject differed but that the consensus was that it would not be worthwhile having the property valued at this stage. On the Balance Sheet of the accounts, property was given a low value of about £20 000; in fact the value was probably nearer £400 000–£500 000. The Executive Committee had over some time, been examining the possibility of sharing Devonshire Street with other institutions who had moved from London but who still wanted a London base. Mr Warner was concerned that the Institute should act before the value of the lease began to fall.

Benevolent Fund

The Benevolent Fund was a matter of some concern to the Institute. Over the past few years there had been a steady income of about £3500 a year but expenditure was consistently low at between £50 and £100 a year. Mr Warner thought the situation 'deplorable'; as the guardians and trustees of the fund that had been provided by the generosity of members he thought the Institute should ensure that the fund was used to the benefit of members in need.

During his own term of presidency in 1985 Mr Warner had written to all the branches explaining the situation and asking them to find out who, in their locality, needed help. The response had been minimal. The point had been made again by subsequent presidents and by the former honorary treasurer in an article in *Energy World*.

Last year it had been discovered that the trust deed of the fund allowed for broader terms of reference than had previously been realised and it had been possible to help some post graduate members with, for example, the cost of having their PhD theses printed.

Mr G Gollin, a past president and a founder of the Benevolent Fund, said that he was disturbed by the situation. He was 'appalled' by the statement attached to the Benevolent Fund accounts that said '. . . the main reason being the small number of applications for help we receive.' People in need, Mr Gollin said, did not apply for help. It was up to the Institute to find out who needed help. Mr Gollin pointed out that a married man's state pension amounted to £64 a week without extra means it was difficult to manage on such a small sum. Even a Christmas present of, say, double what the State paid each year would be appreciated, he thought. Mr Gollin suggested that each branch should elect a member who would be responsible for following up members who retired from membership of the Institute. But, he reaffirmed, that there was no point in waiting for people to apply for help.

Mr W Tipler (Fellow) suggested that as the branches tended to have arisen out of centres of industry and as a number of people, on retirement, moved away from those centres to the coast and it would seem sensible to operate a system that was centred around the coastal resorts.

In order to provide a focal point for the operation of the Benevolent Fund C E Pugh CBE (then president-elect) agreed to become chairman of the Fund during his presidential year.

New members of Council

D Carmichael and M L Hoggarth had been re-appointed to serve on Council for a further year and Dr I Boustead, Dr S D Fawkes and A J Williams had been elected to serve on Council.

Special general meeting

Two bye-laws were changed in the special general meeting, held immediately after the AGM. It was stated in the Institute's bye-laws (Byelaw no 3) that the registered office of the Institute should be in Greater London but Greater London no longer existed and this meant the Bye-Laws were a little ambiguous. 'England' was proposed as a replacement under the rewording.

Bye-law 76 provided that Council must manage the investments of the Institute under the stipulations of the Trustee Investment Act, which was amended from time to time as an Act, but they were expected to follow the provisions, and there were two important provisions which affected the institute. The first was that the Trustees who in the present case were Council must divide the investment into two types, the narrow range which most people thought of as gilt-edged and a wider range which was equities, and the rules under the Act were that 50% of investment must be in each category.

The second stipulation was that the Act required the trustees to operate under the advice of financial professionals.

The Institute had a slightly different circumstance because it was not a trust and therefore the amount invested changed from time to time and investments split fifty-fifty. The Institute had been advised that under present circumstances the ratio of equities to gilt edged might be wisely varied from time to time.

Continued on page 20

Institute of Energy — research fellowship

The Institute of Energy, with the object of promoting study and research into all aspects of energy technology covering extraction, conversion, transmission, distribution and usage of energy, wishes to award a research fellowship in the sum of £2500 to promote such studies. Particular emphasis will be given to:

- New fundamental concepts which are some way from commercial application.
- Underlying trends in energy economics or policies.

The fellowship is open to anyone in academia or industry and applicants should apply to the secretary at the Institute of Energy, 18 Devonshire St, London W1N 2AU, with a brief statement on their proposed area of study and appropriate personal details. The closing date is 30 November 1988.

North Eastern: Energy efficiency in buildings Newcastle upon Tyne, 12 October 1988

The North-Eastern branch of the Institute of Energy is holding a one-day conference and exhibition at the Civil Centre, Newcastle-upon-Tyne on *Wednesday 12 October 1988*. Cost: £40 (including VAT, one set of papers, lunch, morning coffee and afternoon tea). Cost for students: £20.

Programme

0900–0930 Reception desk open for delegates.
0930–0935 Welcome to conference by the chairman, North-Eastern branch, Institute of Energy, *M G Burbage-Atter.*
0935–0950 Introduction to morning session, by the president of the Institute of Energy, *C E Pugh CBE.*

Designing for energy efficiency

0950–1010 Paper 1 *Prof O'Sullivan* (University of Wales).
1010–1030 Paper 2 *Dr T J Wiltshire* (University of Newcastle upon Tyne).
1030–1050 Coffee.

Energy efficiency projects

1050–1120 Paper 3 *B Wright* (J Sainsbury).
1120–1140 Paper 4 To be arranged.
1140–1210 Discussion on morning papers.
1210–1400 Lunch.

Energy management

1400–1420 Paper 5 *B Leighton* (Argyll Stores).
1420–1440 Paper 6 To be arranged.

The way ahead

1440–1510 Paper 7 *Dr H Damskin* (BRECSU).
1510–1525 Tea.
1525–1555 Discussion on afternoon papers.
1555–1600 Closing remarks.

Further information from M G Burbage-Atter, Teesside Polytechnic, Department of Civil and Structural Engineering and Building, Middlesbrough, Cleveland TS1 3BA (tel 0642 218121).

The Greenhouse Effect — help needed for TV programme

The distribution rights for a two part Norwegian television programme, *The ozone alarm*, and *The greenhouse effect* have been obtained by A F Stobart.

In advance of its public broadcasting Mr Stobart can consider showing the programmes to small groups, and meetings, provided that they have got a video recorder, and television screens available. The two programmes combined run for about 1 hr 40 minutes.

Mr Stobart is also discussing the possibility of producing a programme or programmes covering 'counter measures' to the two problems above, for instance, the hydrogen economy, non hazardous refrigerants, renewable energy, energy conservation and so on. If you would like to help or can provide some useful information telephone Mr Stobart on (0423) 330487 or write to him at Walnut Cottage, Great Ouseburn, York YO5 9RG.

Institute of Health Education conference — 13/14 October 1988

Nuclear generation of electricity: implications for public health education is being organised by the Institute of Health Education on 13/14 October 1988 at Heysham and Morecambe.

The conference will take place at the Strathmore Hotel and there will be visits to the Morecambe and Heysham Power Station on the first day.

Day 2 will comprise academic papers, dealing with the production of electricity by nuclear power, safety, epidemiological aspects, and implications for public health education and information campaigns. The invited speakers include Prof A Smith, Dr J Youngson, Dr L Barić and Dr Taylor (CEGB). The papers will be followed by a panel discussion where audience participation will be welcomed.

For more information and booking forms contact: Helen McGuinness, Regional Oncology Support Service, Department of Epidemiology and Social Oncology, Kinnaird Road, Manchester M20 9QL. Tel: 061-434 7721.

Three decades of nuclear safety — 10 October 1988

The Institution of Occupational Safety and Health's eleventh Alexander Redgrave Memorial Lecture, *Three decades of nuclear safety*, is to be given by Dr John Wright, corporate director of Health and Safety, the Central Electricity Generating Board.

Admission to the lecture, at the Royal Institution, 21 Albemarle Street, London on Monday, 10 October 1988 is free but will be by ticket only.

You are invited to apply for tickets from Miss Gail Pickering at the Institution of Occupational Safety and Health, 222 Uppingham Road, Leicester LE5 0QG. Tel: (0533) 768424.

Sizewell B — the first of the UK PWR power stations 13/14 September 1989

Following the exhaustive public inquiry the Sizewell B project was sanctioned by the CEGB on 1 April 1987. The station will be replicated as far as is possible for Hinkley C and the other follow-on plant.

The conference, organised by the Institution of Mechanical Engineers with the Institute of Energy in association, provides the first opportunity for the contractors building Sizewell and for the project's management team to present for discussion papers dealing with these unique features of the design and manufacture of the first UK PWR power station.

Papers relating to Sizewell B are invited on the following topics: power station design, nuclear island systems, turbine generator and auxiliary systems, power station control and protection systems, nuclear island components (reactor pressure vessel), steam generator, pressuriser, pumps, pipework, valves and so on, containment design, containment environmental control, equipment qualification, quality assurance, site organisation and planning.

Abstracts should be sent to: Miss Andrée Johnson, Conference Executive, Institution of Mechanical Engineers, 1 Birdcage Walk, London SW1H 9JJ.

CONTACT Award for professional development

The five member institutions of the CONTACT consortium (the Universities of Manchester and Salford, UMIST, Manchester Polytechnic and the Manchester Business School) have introduced a joint award in continuing professional development (CPD) that will provide continuing education for graduates and professional staff employed in industry, commerce and the public sector. The award will apply to all professions and will be known as the CONTACT CPD Award. It will be given on the basis of credits accumulated for CPD short courses offered by any combination of the five member institutions.

Members wishing to obtain the award may register and attend approved modules of 20 contact hours offered by the five institutions. The Award certificate will be issued on successful completion of six modules. Part module and double module courses will be available and the programme will include evening, part day and full day courses. The selection of courses to satisfy individual interests or career development needs will be the responsibility of the participant but an advisory service will be available if required.

Further information about the award can be obtained from the director of CONTACT, John Entwistle, Manchester Science Park, Lloyd Street North, Manchester M15 4EN. Tel: 061-226 6586.

Institute News — *continued from page 18*

So the purpose of the second amendment to the bye laws was to protect the Institute from future members of Council who might invest the Institute's funds unwisely and lose the Institute's money altogether. It was suggested that the Institute retain the provision that Council must operate subject to retaining the services of professional advisers. The fact that professional advisers were insured against professional incompetence was an ultimate backstop and they would use the flexibility intelligently.

C E Pugh CBE, president of the Institute of Energy and Dr E G Masdin, immediate past president of the Institute of Energy.

The new president

The president, Dr E G Masdin, said that before he joined the very distinguished line of past presidents, a number of whom he was delighted to see at the meeting, he had a final and very pleasant ceremony to conduct which was to install his successor, C E Pugh CBE. Dr Masdin said that members had all greatly appreicated Mr Pugh's contribution to the Institute of Energy.

Dr Masdin said that he had not met Ted Pugh until he became vice-president and that illustrated one of the major benefits of belonging to an institute like the Institute of Energy; the advantage of increasing the individual's network of contacts, professionally and socially. The time was very appropriate in the affairs of the Institute to have the advantage of Ted Pugh's professional experience in senior management to take over and help steer it through into further success and prosperity.

The president then invested Mr Pugh with the badge of office as president. The new president thanked Dr Masdin and presented Dr Masdin with a past-presidents badge and tie. He said how much he had appreciated having worked with Dr Masdin and complimented him on his presidential year.

Next month: *Energy World* will focus on

Energy management

REGISTER OF ENERGY COURSES

Course No 00-93

Title: Understanding heat treatment.
Duration: 3 days.
Location: Aston University, Birmingham.
Starting: 25 October 1988.
Content: Basic metallurgical theory of heat treatment. Quenching principles and practice. Furnace types, materials and heating methods. Salt bath heat treatment. Atmosphere theory, production and control. Temperature measurement. Quality control and laboratory testing of heat-treated materials.

Course No 00-420

Title: International petrochemical marketing — the commercial factors.
Duration: 3–4 days.
Location: St Catherine's College, Oxford.
Starting: 26 October 1988.

Course No 00-414

Title: Laser anemometry.
Duration: 3 days.
Location: Cranfield Institute.
Starting: 31 October 1988.
Content: Introduction to LDA. Introduction to fluids and turbulence. Doppler signal processing. Detailed setting-up. Frequency shifting. Optical criterion. Seeding. Analysis of output. Reynolds stresses and turbulence. Scale of turbulence.

Course No 00-421

Title: Petrochemical markets and economics — the impact of feedstocks and costs on competitiveness and business strategy.
Duration: 5 days.
Location: St Catherine's College, Oxford.
Starting: 31 October 1988.

Course No 00-439

Title: Industrial corrosion.
Duration: 4 days.
Location: The Hague, The Netherlands.
Starting: 1 November 1988.
Content: Types of corrosion. Fundamentals of corrosion. Corrosion testing and measurement of corrosion rates. Corrosion control and prevention. Inhibitors. Organic barriers. Understanding corrosion resistant metallic alloys. Inorganic barriers. Electrochemical protection. Corrosion monitoring. Demonstration of laboratory and in-plant corrosion monitoring equipment. High temperature corrosion. Corrosion failure analysis. Environmental assisted cracking. Control of microbial deterioration of materials. Corrosion in water systems. Materials engineering in industry.

Course No 00-431

Title: Lubricants formulation and application fundamentals.
Duration: 5 days.
Location: St Catherine's College, Oxford.
Starting: 7 November 1988.
Content: An overview of the lubricants market. Principles of lubrication. Lubricant base materials. Additives. Applications. Lubricants marketing trends.

Course No 00-415

Title: Recent advances in design procedures for high temperature plant.
Duration: 1½ days.
Location: UKAEA, Risley.
Starting: 8 November 1988.
Content: Structural analysis. Life prediction. Defect assessment.

Course No 00-436

Title: Safe storage and transportation of hazardous chemicals.
Duration: 2 days.
Location: University of Sheffield.
Starting: 8 November 1988.
Content: Hazards associated with transport and storage of chemicals and relevant legislation, codes of practice and guidance notes relating to controlling them. Planning safe transportation, design of premises for safe storage, safe systems of work, classification and segregation of chemicals and emergency planning for accidents.

Course No 00-432

Title: The international lubricants and functional fluids business.
Duration: 5 days.
Location: St Catherine's College, Oxford.
Starting: 14 November 1988.
Content: Business structure and outlook. Base oil production and technical trends. The wholesale markets for base oils. The lubricant additives business — specification and testing. Blending technology and environmental issues. The automotive lubricants markets. The industrial lubricants markets — complex and technical. Marine and aviation — the international businesses. The functional fluids business — a review. Synthetic lubricants — technology and market trends. Changing industry structure.

Course No 00-423

Title: Fluid power systems.
Duration: 3 days.
Location: BHRA, Cranfield.

Course No 00-440

Title: Contracting pitfalls.
Duration: 3 days.
Location: Amsterdam, The Netherlands.
Starting: 16 November 1988.
Content: Project characteristics. Contracts development. Contracts administration. Discussion forum on timely and controversial issues. Significant pitfalls in contracts development and administration. Applications workshop. Case study critique. Contracting pitfalls.

INSTITUTE OF ENERGY CONFERENCES

The following programme of conferences is currently being organised by the Institute of Energy, and its associated overseas societies, and other UK societies 'in association' for the event. See also Branch Conferences on p 17.

In 1988

12/13 December **Fluidised combustion in practice — clean, versatile, economic?**
Venue: Scientific Societies' Lecture Theatre, London
Chairman: J S Harrison (British Coal)

In 1989

16/18 May **Industrial energy management conference**
Venue: NEC, Birmingham
Chairman: J R Monson (British Steel)

5-8 September **Applied Energy Research**
Venue: University of Swansea
Chairman: Prof A Williams (University of Leeds)

In 1990

9/10 May **Ceramics for energy — new opportunities and applications**
Venue: Sheffield Polytechnic
Chairman: M L Hoggarth (British Gas)

Conferences with which the Institute is in association: 1988/89

In 1988

18 October **Combustion Instrumentation '88** (Institute of Physics)
Venue: Octagon Centre, Sheffield
Contact: Clive Herrod, NEI International Combustion on (0332) 271111

6/7 December **National energy management conference and exhibition (NEMEX '88)**
Venue: Metropole Hotel, Birmingham
Contact: Energy Systems Trade Association (ESTA) on 045 387 3568

In 1989

19/20/21 April **Desulphurisation in coal combustion systems** (Institution of Chemical Engineers)
Venue: University of Sheffield
Contact: Conferences Department, Institution of Chemical Engineers on (0788) 78214

7–12 May **6th international conference on fluidisation** (Engineering Foundation, New York)
Venue: Banff, Alberta, Canada
Contact: Harold Comerer, Engineering Foundation, 345 East 47th Street, New York 10017. Telex: 126022

13/14 September **Sizewell B — the first of the UK PWR stations** (Institution of Mechanical Engineers)
Venue: Manchester
Contact: Miss Andrée Johnson, Institution of Mechanical Engineers on 01-222 7899.

27–29 November **3rd conference on tidal power**
(Institution of Civil Engineers)
Venue: Royal Institute of British Architects, London
Contact: Conference Office, Institution of Civil Engineers on 01-222 7722

CONFERENCES

October 1988

Fuel for today and for the future

Symposium, Pittsburg, 4–6 October 1988.
Details from Dr Stanley Harding, Consolidation Coal Company, R & D, 4000 Brownsville Road, Library PA 15129, USA. Tel: Int + 1 412 854 6735.

Technology of turbine plant operating with wet steam

Conference, London (Tara Hotel), 11–13 October 1988.
Details from the Conference Office, British Nuclear Energy Society, 1–7 Great George Street, London SW1P 3AA. Tel: 01-222 7722.

Decommissioning of major radioactive facilities

Conference, London (Institution of Mechanical Engineers), 11–12 October 1988.
Details from Miss Andrée Johnson, Conference Department (C371), Institution of Mechanical Engineers, 1 Birdcage Walk, London SW1H 9JJ. Tel: 01-222 7899, tlx: 91744, fax: 01-222 4557.

Building on expertise — Europec '88

Conference, London (Royal Lancaster Hotel), 17–19 October 1988.
Details from Dr Ken Winckle, BP Exploration Company, Britannic House, Moor Lane, London EC2Y 9BU. Tel: 01-920 4800.

Gastech '88

Conference and exhibition, Kuala Lumpur (Malaysia), 18–21 October 1988.
Details from John Gwynne-Jones, Sales Director, Gastech Secretariat, 2 Station Road, Rickmansworth, Herts WD3 1QP. Tel: (0923) 776363, tlx: 924312 Gastec G, fax: (0923) 777206.

Industrial measurement systems

Seminar, London (Wembley), 27 October 1988.
Details from Dr W A Evans, Department of Electrical and Electronic Engineering, University of Wales, Swansea SA2 8PP.

November 1988

World electricity

Conference, London, 14–15 November 1988.
Details from Financial Times Conference Organisation, 126 Jermyn Street, London SW1Y 4JJ. Tel: 01-925 2323, tlx: 27347 FTCONF G, fax: 01-925 2125.

Tunnel construction, exploratory drilling and associated oilfield technology

Meeting, London (Geological Society), 22 November 1988.
Details from the Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR. Tel: 01-580 3802, tlx: 261410.

November/December 1988

Remote techniques for inspection and refurbishment of nuclear plant

Conference, Stratford-upon-Avon (Moat House Hotel), 28 November–1 December 1988.
Details from the Conference Office (Ref 190/11/4), Institution of Civil Engineers, 1–7 Great George Street, London SW1. Tel: 01-222 7722.

December 1988

Cogeneration applications

Workshop, Amsterdam (Netherlands), 9–10 December 1988.
Details from the DELTA-H Institute, PO Box 1053, Springfield, NJ 07081, USA. Tel: (201) 654 9533, tlx: 238667 ATT DELTA.

April 1989

Rotterdam oil symposium

Rotterdam World Trade Centre, The Netherlands 12–13 April 1989.
Details from Stichting ROS, PO Box 29822-2502 LV, The Hague, Netherlands.

May 1989

SCITECH 89

Exhibition, London (Alexandra Palace and Park), 17–21 May 1989.
Details from the British Science and Technology Trust, 78 Bollo Bridge Road, London W3 8AU. Tel: 01-992 0684, tlx: 894345 LASERS G.

June 1989

Power plant UK 89

Exhibition, Birmingham (NEC), 20–23 June 1989.
Details from exhibition director, Power plant UK 89, Holly Road, Hampton Hill, Middlesex TW12 1PZ. Tel: 01-783 0055, tlx: 21697 DRAKHO G, fax: 01-783 1678).

August 1989

International environmental exhibition and congress — Sweden 1989

International trade show and conference, Gothenburg (Sweden), 28–31 August 1989.
Details from Rolf Lindqvist, Swedish Exhibition Centre, Box 5222, S-402 24 Gothenburg, Sweden. Tel: Int + 46 31 200 000, tlx: 20 600, fax: 46 31 16 03 30.

September 1989

Energy for tomorrow

World Energy Congress and Exhibition, Montreal (Canada), 17–22 September 1989.
Details from British National Committee, World Energy Conference, 34 St James's Street, London SW1A 1HD. Tel: 01-930 3966, tlx: 264707 WECIHQ G, fax: 01-925 0452.

Organic geochemistry

International Congress, Paris (France), 18–22 September 1989.
Details from Ms Yolande Rondot, Institut Francais du Petrole, BP 311, 92506 Rueil-Malmaison Cedex, France. Tlx: A 203050 F, fax: 33-1 47 49 04 11.

October 1989

Waste management

Joint international conference, Kyoto (Japan), 23–28 October 1989.
Details from Japanese Organising Committee, c/o Japan Society of Mechanical Engineers, 4–9 Yoyogi 2-chome, Shibuya-Ku, Tokyo, Japan (fax 03-379-0934) *or* American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017, USA.

Coal science

International conference, Tokyo (Japan), 23–27 October 1989.
Details from Secretariat for ICCS, Coal Conversion Department, New Energy Development Organisation (NEDO), Sunshine 60 Building, 1-1, Higashi-Ikebukuro 3-chome, Toshima-ku, Tokyo 170, Japan.

Rooftop air conditioner

A new package rooftop air conditioning unit has been introduced into the UK by **Silentair.** Designated type EPR, the new unit is aimed at the refurbishment market. The EPR is available with outputs of 5-7 m^3/sec (75-115kW), applications including shops and stores with an air conditioning requirement for 5000ft^2 upwards.

The EPR uses a centrifugal fan as either a condenser fan, an extract return air fan or for both purposes according to requirements. The balance of air flow is controlled by means of four motorised dampers operated by a signal reflecting the difference between return air temperature and ambient temperature. By modulating the dampers a constant air flow is guaranteed over the evaporator coil as well as the condenser coil.

The air flow over the condenser coil is always a mixture of two air streams — return air and ambient air (except in boost heating mode). The result of this configuration is:

- In the cooling mode the air temperature entering the condenser is lower than the ambient temperature, resulting in reduced energy consumption of the compressors.
- In the heat pump mode the air temperature entering the condenser is higher than the ambient temperature. Entering air temperature is anticipated at about 5°C, thereby increasing the efficiency of the heat pump.
- The head pressure is self balanced, for example, in a situation of free cooling with one stage of cooling on the condenser there is a high proportion of return air compared to ambient air. The air temperature of this mixture will be high enough to ensure operation of the compressors at desired head pressure without dropping down.

Reader enquiry no 9/1

Cooling detectors

EG & G ORTEC's Electricooler, for cooling germanium gamma-ray detectors is now compatible with the company's PopTop transplantable detector capsules. Any detector capsule can be attached by the user of the *Electricooler* unit for rapid cooling without the use of liquid nitrogen.

The detector element, which formerly could be placed only in horizontal and vertical orientations, can now be used in a variety of configurations. A temperature controller has been added, which maintains the detector element at constant temperature regardless of variations in room temperature and thus minimises energy resolution.

The unit can be used in stack monitoring at nuclear power plants, primary coolant loop monitoring, isotope fabrication and reprocessing, well logging, and nuclear waste storage facilities.

Reader enquiry no 9/2

Propane fired radiant heater

A mobile radiant heater incorporating a pressure jet gas unit to be manufactured in the UK will be launched in October. The Jetrad propane fired heater has been developed by **Benson Heating.** It features a specially manufactured ceramic fibre that works as an effective insulator and a gas afterburner.

The equipment, with a low flame heat input of 80000Btu/h on low flame and 120000Btu/h on high flame, is based on propane fired into a large ceramic cylinder. The products of combustion are insulated from the outer casing by the vacuum formed ceramic lining and are allowed to vent naturally through a woven ceramic robing which ensures any slight remaining unburnt fuels are completely eradicated.

Reader enquiry no 9/3

Combustion analysis

Bacharach have introduced the Model 300 combustion analyser with printer (pictured). The model 300 is a portable, short-term combustion analyser for a boiler, furnace or any residential, commercial or industrial combustion process.

Model 300 combustion analyser

The analyser has three large digital displays, each independent and continuous, that offer the following combustion information: stack temperature, carbon monoxide from 0-4000ppm, and sensor status, percent oxygen, excess air and oxygen cell output, percent combustion efficiency, percent loss and percent carbon monoxide.

Reader enquiry no 9/4

Energy saving module

Brooks Electronics have introduced two energy modules for use with the company's range of soft start systems.

The Type P307 Cyclic Knock-off module is designed to enable three-phase induction motors to be stopped for a set period of time in every hour. When used in conjunction with a soft start system it is claimed that the module will ensure that the constant stop-starting of the drive motor has less effect on the maximum demand due to a lower inrush of current at re-start.

The module is suitable for applcations within the service sector of industry such as air conditioning plant, circulating pumps, extractor fans and certain types of compressors.

Reader enquiry no 9/5

Current transducers for UPS

Uninterruptible power supplies (UPS) are employed to back up computers and microprocessor based equipment, they are used in data processing, process control, telecommunications and security systems. Hall Effect transducers have been introduced to monitor the current to the battery which supplies the UPS in the event of mains failure.

Manufactured by **HEME International,** the current transducers are easily mounted so that the current-carrying dc battery line passes through the transducer. No break in the charging circuit is necessary. The transducer is connected to a digital meter which indicates whether the battery is charging or discharging. Previously analogue meters were used, for which it was necessary to incorporate a shunt.

Output from the Hall Effect current transducer is also fed into the rectifier controller to control the rate of charging of the battery.

The current transducers are made in a variety of models covering 25A-12kA. In addition, the company is able to produce custom designs up to 100 kA to suit special user requirements.

Reader enquiry no 9/6

Valve range extended

Gestra have added to their range of electric and pneumatically actuated two way and three way control valves. Larger sizes are now available for pipe sizes up to 300mm (12″), pressure ratings have been increased to 100 bar (1450psi) and valve body materials now include cast iron, spheroidal graphite iron, carbon steel, alloy steel and stainless steel. The range now extends from 15mm (½″) to 300mm (12″) nb.

Typical applications include steam pressure reduction, steam surplussing and temperature control using steam, hot water, cooling water and thermal oils.

Valves with pneumatic adaptors can be supplied with pneumatic or electro-pneumatic positioners for modulating control or simply with three-way solenoid valves for on-off applications. Electrically actuated valves may also be used for on-off or modulating control and can be fitted with electronic valve positioners for simple positioning using 4–20 mA or 0–10V control signals.

Reader enquiry no 9/7

Trade publications

The Automatic Controls Group of the HEVAC Control Manufacturers' Association have published the *Product and services directory for the control of domestic central heating.* The centre pages of the guide contain a matrix of members' products. There is also a separate list giving members' activities, addresses, telephone and fax numbers.

Reader enquiry no 9/8

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

Name .....

Address .....

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Organisation .....