

components, chiefly nuts and bolts, by the carbon dioxide gas that transfers heat from the reactor to the turbines is certainly more serious than implied by the bland statement of the CEBG that the reactors, although working at reduced power, are still producing electricity at more than the prescribed 75 per cent load factor. The plain fact is that the failure, which is one of basic design, is costing the CEBG about £25,000 a day in extra generating expenses and the situation is unlikely to be remedied for many months ahead.

Why has such a basic design weakness only now come to light? Was the design team responsible for the Magnox reactors taking a sensible risk or a wild gamble in advocating the use of these mild steel components in an environment of carbon dioxide at the elevated temperatures of the Magnox system? And what would have happened if the CEBG had not smelt a rat in its inspection of Bradwell station last year?

The CEBG is, naturally enough, taking refuge in the experimental status of the Magnox programme when it was conceived. It was accepted practice, according to the CEBG, to assume that mild steel parts would endure the thirty year life-span of the reactors without corroding, and it was only when sample baskets were removed from the Bradwell reactor last year that the possibility of a serious defect was realized. A different mild steel was involved there, but attention soon switched to the other components and the corrosion was discovered. Of the seven Magnox reactors operated by the CEBG, only the one at Berkeley, which runs at a lower temperature, was found to have escaped unscathed.

Fears that the advanced gas cooled stations may be blighted by the same trouble are thankfully unfounded. Although carbon dioxide is also used in the AGR system, the operating temperature is so much higher that completely different corrosion resistant components had to be used from the outset. The Magnox reactors may now have to be fitted with components of the same design, although it appears that the engineering factors involved in replacing or modifying the bolts, clamps and nuts have not yet been clarified. The CEBG says that it is hard to find the exact temperature conditions which are critical for the steel components because each reactor has its own particular features, and it seems that the CEBG is still groping to find a satisfactory explanation of the mishap.

Although the commissioning of the Oldbury reactor in 1968 marked what must surely be the rounding off of the Magnox programme, the disclosure of the fault has come at an unfortunate time for the nuclear power industry. The new consortia are very conscious of the need to clinch a major export contract soon, and, although both the SGHWR and AGR systems differ markedly from the Magnox design, the lack of a clear explanation for the faults can hardly bolster confidence.

There is also some doubt as to whether the CEBG has been as forthcoming as it might have been about the corrosion faults. The costs of switching the generation of 400 MW of electricity from nuclear to coal stations, as required by this turn of events, may well mount to two or three million pounds, and such sums of money can hardly be swept under the carpet without treading on somebody's toes.

UNIVERSITIES

University Statistics

STATISTICS just published by the University Grants Committee indicate that the total number of full-time students at British universities rose from 184,799 in 1966-67 to 200,121 in 1967-68. In the same period, the number of staff rose from 23,609 to 25,353. The 8.5 per cent increase in student numbers was therefore accompanied by an 11.5 per cent increase in the number of teaching and research staff paid directly from university funds, and this maintained the student-staff ratio at about eight to one.

The percentages of students in particular disciplines remained approximately constant during this period, except for the proportion taking arts subjects, which, reflecting the swing towards the arts in the sixth forms, rose from 20.4 per cent of the total in 1966 to 21.3 per cent in 1967. However, the proportion of women in the total reached 27.4 per cent, continuing a slow but steady upward trend, and they showed a greater affinity for arts subjects than the men did—11.1 per cent of the women and 6.0 per cent of the men reading arts subjects. But the most striking comparison is that 22.0 per cent of the men read engineering subjects, compared with only 0.9 per cent of the women, and that this percentage has remained fairly steady for the past few years. The total recurrent expenditure by the universities increased by £17.1 million to £139.5 million, while non-recurrent expenditure fell slightly from £79.9 million during the 1965-66 academic session to £79.4 million in 1966-67. These figures represent total university expenditure, towards which the Government provided £220.8 million, the rest being supplied mainly by industrial research contracts and donations. Salaries swallowed up over one-third of the recurrent expenditure, and departmental expenditure met by research grants took a further 12 per cent.

Figures for university expenditure are now published two years after the session for which they apply, and those for student numbers are one year old. It seems that the reason why they are so late is because of the difficulty in gathering the necessary information and in subsequently compiling the statistics.

HIGHER EDUCATION

Talks on Universities

MRS SHIRLEY WILLIAMS, Minister of State for Education and Science, met the Committee of Vice-chancellors and the University Grants Committee last week to talk over the way in which higher education should develop during the next ten years. The talks, which took place at University College, London, were chaired by Mr Kenneth Berrill, chairman of the UGC, and are described as informal by the Department of Education and Science. They are on how the universities can accommodate the expected increase in demand for places in higher education.

Official projections indicate that if children at present in primary schools are to have the same chance of getting to university as the sixth formers now, the numbers of students in higher education, about 360,000, must double by 1980. Expansion of this order is 40 per cent more than that recommended in the Robbins Report, and the DES projections

require that there should be about 630,000 places by 1976 and 780,000 by 1980. Such an expansion would put a very severe strain both on finances and on manpower, and the talks this week centred on how a variety of possible measures in the university sector could alleviate the situation. Most of the measures canvassed "in very general terms" have been bandied about before, and have caused alarm in various quarters. Four-term years, student loans, regionalization of intake, staff-student ratios and the extension of part-time and correspondence courses seem to have been predominant in the discussions. In particular, student loans and regionalization of intake have been consistently attacked by the National Union of Students, and the fact that the talks have begun without any formal student representation will no doubt cause resentment in the student body.

Although the DES statement said that "no conclusions were sought at this meeting", it also indicated that decisions will have to be made on many of these issues next year. Parliament could therefore be faced with a higher education bill during the coming session or the measures canvassed are likely to find expression in the UGC recommendations for the 1971-76 quinquennium.

PARTY CONFERENCES

Conservative Science

THE Conservative Party Conference in Brighton next week will follow hard on the heels of the Labour Conference. Like the previous occupants of the Top Rank Centre, the Conservatives are unlikely directly to have much to say about science and technology—the only motions of much concern are those on education and on the Common Market. Although these are largely restatements of accepted party policy, education will probably be a highly charged issue at the conference. The second "Black Paper" on education, which is due to be published on the eve of the education debate, could cause some embarrassment to Sir Edward Boyle, whose views are generally considered to be more liberal than those of most of his colleagues and of the first so-called Black Paper. That publication, which sold more than 25,000 copies, was primarily designed to draw attention to an alleged decline in educational standards in Britain and argued for maintaining a system of selective secondary education. The second paper is obviously intended to influence the conference when it votes on the motion proposed by the Workington Divisional Association, condemning the Government for talking of making local authorities introduce comprehensive education. Conservatives will be urged next week to take "any necessary action to remedy this proposal" when they next take up office.

A motion proposed by Mr Eldon Griffiths, on behalf of the Bury St Edmunds Conservative Association, merely restates the Conservative policy accepting the need to join the Common Market. "A major contribution to the security and prosperity of Britain" and the enhanced ability "to discharge more effectively its responsibilities for the maintenance of peace and for the improvement of conditions in the developing countries" are the chief arguments for joining the Common Market put forward in the motion. There are, however,

enough hostile motions submitted to the conference to suggest that this motion will not have an easy passage through the conference.

SPACE

Busy Weeks Ahead

from our Astronomy Correspondent

EVEN without the launch of Apollo 12 on November 14 for a landing site in the Ocean of Storms, the weeks ahead are going to be busy in space. By now, ESRO's fourth satellite should be in orbit, and launches are being prepared for the first Skynet satellite for British defence communications, the first German satellite and the third in the Italian series of "San Marco" satellites.

At the same time, the space agencies are going through an introspective phase. In the United States, people are wondering what sort of programme NASA should carry out within the framework laid down by the task force under Vice-President Agnew which reported last month. And Europeans are considering how best to set up a space organization which would combine the functions of ELDO and ESRO and yet have escape clauses for countries such as Britain which are not enamoured by part of the programme as it stands.

If the number of successful satellites produced is a fair barometer of ESRO's health, then the organization must be glad to have its fourth satellite on the stocks. The launch comes at a time when the always meagre finances of ESRO are being threatened by a proposed reduction in the French contribution. But it is difficult to see how ESRO can gain much confidence from the latest satellite, which is nothing more than the spare flight model of the ESRO 1 satellite launched a year ago. Approval for the launching came at an ESRO council meeting in March where it was the most modest of the projects which received the go-ahead. After ESRO 1b, as it is called, the next European satellite will not be until 1971.

Like its predecessor which was launched almost exactly a year ago, on October 3, 1968, ESRO 1b is to be placed in a polar orbit to study ionospheric and auroral phenomena, in particular over the northern polar regions in winter. The eight experiments which it carries are of course the same as in ESRO 1, but with minor improvements. Five of the experiments—from the Radio and Space Research Station (Slough), Kiruna Geophysical Observatory (Sweden), the Danish Space Research Institute, the University of Bergen and the Norwegian Defence Research Establishment—are to count electrons and protons of different energies and in different directions. Two experiments from University College, London, are Langmuir probes to measure positive ion composition and temperature and also electron density and temperature. The eighth experiment is from the Norwegian Institute of Cosmic Physics and consists of photometers to measure auroral luminosity.

The Skynet satellite, which was to have been launched by a Delta rocket early in October for the British Ministry of Defence, has been postponed until November, and an investigation of the series of Delta failures continues. Since September last year, four satellites have been lost because of Delta failures, including