in the last three years of the plan, if the 200 thousand million target is to be reached.

The Minister said that of the total expenditure on science some 12–15% is allotted to fundamental research, and the rest to applied research projects, the latter being financed half from the central budget and half from industry by means of research contracts. The implementation of such applied research in production is Poland's biggest problem. This statement is true also of the Soviet Union, but whereas Soviet scientists frequently receive official rebuke for not producing the results that industry needs, the problem in Poland, says Kaliski, is that they "often have very good scientific results but no chance of introducing them". Poland's scientists, he explained, "think that if they have obtained a result, that it must be introduced". This was not always feasible under a socialist system;

under capitalism it would always be possible to find some manufacturer who would undertake to introduce a new process simply for profit motives, but in a system of state planning this was not always possible. To test promising innovations at the pilot stage, he pointed out, the Polish Academy of Science possesses a small pilot factory. The main activity of the Academy, however, is fundamental research and "quality potential", rather than the development of individual applications.

Concerning Comecon, Kaliski said that Poland participated principally in mining, computers, electronics and laser physics. In atomic power engineering, the Poles were "not the leading group—but we all contribute". In the Interkosmos space programme, Poland was concerned mainly with on-board computers, the application of space research to cartography and meteorology, the study of plasma *in vacuo*,

magnetic field research, and signal propagation. She was involved in "serious collaboration" in space medicine. Kaliski appeared quite satisfied with the present scheme of financing Comecon research projects by direct contracts between the countries concerned, and showed no interest in the more sophisticated arrangements suggested recently in the Polish journal of international affairs *Sprawy Miedzynarodowe*.

One interesting feature of Kaliski's visit was his meetings with laser physicists. These were not, strictly speaking, in his capacity as Minister. In addition to his governmental duties, Professor Kaliski is head of the Institute of Plasma Physics and Laser Microsynthesis in Warsaw. In an informal lecture which he gave at the Rutherford Laboratory, Chilton, he described the work of the Institute on microthermonuclear synthesis.

BRITAIN

More of the same

The UK Government has published details of its proposed expenditure plans for the next few years and its Defence Estimates for 1977. Chris Sherwell reports

LAST week's White Paper, *The Government's Expenditure Plans, Volume II* (Cmnd. 6271-II, HMSO, £2.35), which follows publication earlier of a general account of the plans, contains the details of individual expenditure programmes. Twelve months ago the government published its plans for the rest of the decade, and these promised a painful levelling off in the growth of expenditure. Since then the government has announced two rounds of further measures, in July and December; the impact of the latter has yet to be assessed and incorporated into figures for 1979–80 onwards.

Unsurprisingly, the latest plans confirm the trend foreshadowed last year. Because organised research and development in Britain has a large government element, this means that the circumstances under which the country pursues its science effort remain far from happy. Some of the details from the White Paper are contained in Table 1 (see over).

For the Ministry of Defence, which is the government's biggest spender on R&D, the table shows only the trend in the overall budget. Latest plans are available in more detail in the *State-*

ment on the Defence Estimates 1977 (Cmnd. 6375, HMSO, £1.50). Expected expenditure on the defence research programme in 1977–78 amounts to £123 million, two-thirds of it devoted to "evaluation and exploratory development" on equipment and weapons, the rest devoted to maintaining a base of scientific knowledge and advancing technology. Another £23 million-worth is linked with civil research.

Defence research did not escape the public expenditure axe last year, and the White Paper confirms this trend too. Implementation of the rationalisation of R&D establishments is described as "well advanced with the first major moves now taking place". By the early 1980s four "systems establishments"—sea, land, air and underwater—complemented and supported by eight "technology establishments", will have replaced the 25 original R&D establishments.

With the reviews of future levels of R&D at Porton complete, work on chemical warfare at the Chemical Defence Establishment (CDE) "can be reduced to about two-thirds its present size", the White Paper says; and the future of the Microbiological Research Establishment (MRE), because microbiological research requirements can be met "by a small team of ten scientists" integrated within the CDE, depends "on the scale and range of civil requirements".

Other details from the White Paper on expenditure include:

- Support for the National Physical

Laboratory, the National Engineering Laboratory and Warren Spring Laboratory (the Department of Industry's Industrial Research Establishments), together with department-sponsored work at the Atomic Energy Authority (UKAEA) and the Natural Environment Research Council (NERC), is expected to remain at broadly the same level up to 1980–81. The general industrial research and development programme overall, however, has been reduced by £2 million compared to last year "as a contribution to savings in public expenditure".

- The pattern of funding for R&D in certain aviation fields will be modified if and when the new nationalised industry, British Aerospace, comes into existence with the passage of the Aircraft and Shipbuilding Industries Bill through parliament.

- Reflecting developments in the past year involving the country's nuclear reactor programme, the White Paper says that the provision for R&D by the UKAEA is now "subject to adjustment in the light of the current review" of the programme.

- The Science Budget, which indicates the organised government effort on the civil side in basic sciences, reflects the reductions of last year. Resources devoted by the Science Research Council to 'big science', the White Paper says, will be reduced by about 25% over the survey period. The breakdown for 1976–77 is shown in Table 2.

- In most nationalised industries, but especially electricity and telecommunications, the lower forecasts of investment in fixed assets are the product of revised estimates of demand. □

Table 1 Trends in science-related expenditure of UK government (£ million at 1976 survey prices)

	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80 ¹	1980-81 ¹
Defence budget ²	5,460	5,265	5,548	5,621	5,444	5,397	5,652	5,630
Industrial innovations, of which:	370	359	373	281	224	214	207	301
General industrial R & D ³	38	39	42	51	56	61	66	68
Technological and industrial sponsorship	6	5	7	8	11	12	12	12
Aircraft and aero-engine R & D	26	25	19	19	13	12	12	12
Concorde development and production	116	102	81	37	34	28	19	12
RB211 and other aircraft and engine	64	76	92	11	-11	-5	-6	-6
Space	18	22	25	30	25	20	20	20
Nuclear	102	90	107	127	97	86	83	83
Research councils ⁴	229	232	235	217	216	215	217	215
Expenditure on fixed assets by:								
National Coal Board	122	200	241	293	332	373	360	377
Electricity Council and Boards	657	667	699	704	646	622	586	570
South of Scotland Electricity Board	109	88	73	59	45	66	97	132
British Gas Corporation	182	267	368	259	233	307	345	345
British National Oil Corporation	—	—	53	148	173	210	255	330
Telecommunications (Post Office)	1,004	943	916	917	865	906	881	901
Health and Safety at Work ⁵	15	13	26	30	35	33	34	34

¹Figures shown are those of last year's survey.²About 12% of last year's defence budget went to R & D.³Includes the Department of Industry's Industrial Research Establishments and department sponsored work at the UKAEA and NERC.⁴See Table 2 for pattern of each Council's Expenditure in 1976-77.⁵New category, covering allocation for activities of Health and Safety Commission and Executive under the 1974 Health and Safety at Work Act.Source: *The Government's Expenditure Plans, Volume II* (Cmd. 6721-II, HMSO, £2.35).

Table 2 Pattern of Council spending for 1976-77 Science Budget (£ millions)

	Agricultural Research Council	Medical Research Council	Natural Environment Research Council	Science Research Council	Social Science Research Council	Total
Research grants and contracts	1.5	11.0	2.2	26.6	4.1	45.4
Research units and establishments	6.8	20.6	17.0	40.8	0.7	85.9
Research Council grant-aided institutes	9.1	0.0	2.0	0.0	0.0	11.1
Postgraduate awards	0.1	2.5	1.9	11.8	5.0	21.3
International subscriptions	0.0	1.1	0.0	31.5	0.0	32.6
Centrally supported schemes and administration	0.8	2.2	2.9	6.5	1.4	13.8
Total	18.3	37.4	26.0	117.2	11.2	210.1

Table does not include expenditure by the Natural History Museum and the Royal Society (£8 million).

Source: *The Government's Expenditure Plans, Volume II*

BANGLADESH

● India's construction of a barrage across the Ganges river at Farakka, about 18 km upstream from the Bangladesh border, is diverting water from the Ganges into the Bhagirathy-Hooghly river. The aim is to flush the silt off the river bed and so keep the Calcutta Port navigable throughout the year. But the project poses a threat for Bangladesh, a densely populated state on a delta whose main artery is the Ganges.

It is estimated that the water from the Ganges and its tributaries serves about 37% of the area of Bangladesh in which about 25 million or nearly one-third of the total population live. About 40,000 cusecs of the Ganges water are redirected into the Hooghly river in dry months, and the effects of such diversion could be severe. Irrigation of 400,000 acres of land dependent on Ganges water was noticeably affected in the last dry season.

According to recent statistics published by Bangladesh Water Development Board, the average discharge of

the Ganges at Hardinge Bridge during the last 10 days of December 1976 stood at 74,000 cusecs, as against 47,200 cusecs during the corresponding period of 1975. Before construction of the barrage the flow in this period varied from 118,000 cusecs to 167,000 cusecs; the average flow during March is normally 74,000 cusecs.

Particularly worrying are the rise in the salinity of the water and the extent of saline intrusion into the land from sea. The index of salinity in the Bhairab river went up to 13,600 micromhos per cm² in April last year, compared to the historical average of 500 micromhos. The saline penetration inland advanced from the normal 270 km to about 440 km from coast, affecting an area of 6,820 km² beyond the limits of past years. The salinity of the Ganges water has since recorded a further rise. In some parts, particularly in Bhairab river, the salinity index has exceeded 15,000 micromhos per cm²; it may rise further next spring.

The reduced water flow and in-

creased salinity will in addition have deleterious effects on the forest resources of Bangladesh: Sunderbans, the largest forest reserve near the coastal belt, faces the possibility of thinning out and an ecological imbalance for men and animals there. The ecology of aquatic life is also adversely affected: the depletion of water levels in dry months and enhanced salinity have affected the fish population at the key landing sites, and there could be long term effects on spawning cycles, fish size and variety.

● Bangladesh has been elected a member to the 58-member Governing Council of the United Nations Environment Programme (UNEP). The council is one of the semi-autonomous special bodies of the United Nations with headquarters at Nairobi. Asian states have 13 seats in the body; other countries from the Asian Group elected together with Bangladesh are China, Philippines, Indonesia and Syria.

M. Kabir