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SCIENCE AND PUBLIC EXPENDITURE 1986

a report to the
SECRETARY OF STATE
FOR EDUCATION & SCIENCE
from the
ADVISORY BOARD FOR
THE RESEARCH COUNCILS

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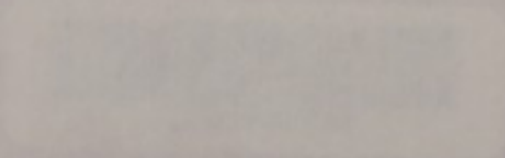
THE ADVISORY BOARD FOR THE RESEARCH COUNCILS was established by the Secretary of State for Education and Science in 1972 with the following terms of reference:-

- a) To advise the Secretary of State on his responsibilities for civil science with particular reference to the Research Council system, its articulation with the universities and departments, the support of postgraduate students and the proper balance between international and national scientific activity;
- b) To advise the Secretary of State on the allocation of the Science Budget amongst the Research Councils and other bodies, taking into account funds paid to them by customer departments and the purposes to which such funds are devoted;
- c) To promote close liaison between Councils and the users of their research.

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- DES Assessor

28 April 1986

DEAR SECRETARY OF STATE

**PUBLIC EXPENDITURE SURVEY 1986
ADVICE FROM THE ABRC**

1. At the outset of each year's public expenditure survey the Board submits advice on the financial position of the Science Budget. This year's advice is attached.
2. In successive submissions the Board has expressed its concern at the financial pressures on the science base implied by the Government's expenditure plans. Although some relief has been offered in successive public expenditure settlements, the additions have not been adequate to check the steady erosion of purchasing power. The prospect for the science base on current expenditure plans is thus one of steady decline in both the scale and quality of the research that can be sustained.
3. At the same time, the demands made on the science base are growing. There are industrial demands, with signs of growing concern among senior industrialists that the continued erosion of the science base, which they see as vital for their needs and a clear responsibility of Government to maintain, will seriously harm their future. There are social demands, such as the need to do something about AIDS. The scope for the Research Councils to match scientific opportunities to these national needs, especially economic needs, has never been greater: across the whole spectrum of research conceptual advances and the availability of new techniques have opened up new fields of enquiry with enormous potential for practical application - notably the new science-based technologies which hold the prospect of revitalising existing industries and launching new ones.
4. The Research Councils have made an exceptional response to the challenge which these opportunities offer. Resources have been redeployed into new growth areas on a considerable scale. The decisiveness with which Councils have reshaped their programmes and the scale of the upheaval involved must be without parallel anywhere in the public or private sector: over 3,000 posts will have been shed this decade in two Councils alone, representing 30% of their manpower.
5. But despite these efforts, the overall constraints on the Councils make it impossible for them to match the international competition in the scale of their investment, even allowing for much greater selectivity than hitherto. The pace of scientific investment is set internationally: if we lag too far behind, more of our talented scientists will leave us while those who stay here become increasingly demoralised and out of touch with developments at the frontiers of their fields. Councils' evidence to the ABRC plainly conveys their sense of national loss at not being able to fund to international standards the talent that exists in this country. On the ground the morale of the scientific community has never been lower.
6. Last year we recommended that you bid for an increase of a cumulative 2%-2.5% in the then expenditure plans for the Science Budget. The outcome of the settlement was a simple 2.5% addition in 1986-87. This year our bid is for increases of £35m (5%) in 1987-88; £50m (8%) in 1988-89 and £60m (10%) in 1989-90 plus whatever may be necessary to compensate SERC for the unforeseen increase in the cost of its international subscriptions (£9m at the latest reckoning).

There are two essential reasons for the increase in our bid over last year's:

i) last year the Board's bid represented a halving of the total of bodies' claims. Our moderation of their claims was largely arbitrary, reflecting our view of what it would be realistic to bid for, given the Government's overall public expenditure policy. We did not feel that we could similarly moderate their claims this year, such was the concern expressed to us about the cumulative effect of the pressures of recent years on the strength of the science base;

ii) our conviction of the **positive case** for increasing the nation's investment in science. The Research Councils are making a tremendous effort to meet national needs: the relatively small injection of additional funds which our bid represents would enable them to develop properly the programmes described in section 5 of our advice; including programmes of great potential for the future international competitiveness of British industry.

7. I look forward to discussing the Board's analysis and recommendations with you, if you would find that helpful. I hope you will be ready to agree to publication of the advice, in due course.

DAVID PHILLIPS

1986 PUBLIC EXPENDITURE SURVEY:

ADVICE OF THE ADVISORY BOARD FOR THE RESEARCH COUNCILS

1. Introduction

1.1 This submission presents the Board's annual advice to the Secretary of State on the implications of the Government's expenditure plans for science, with particular reference to the Science Budget. The Science Budget - some £580m in 1985-86 - goes mainly as grant in aid to the 5 Research Councils which support civil scientific research in higher education and in their institutes; and related postgraduate education. Although the Science Budget is the principal focus of this submission, the Board has necessarily had regard to the general support of research activity in universities from UGC funds which represents the other limb of the dual support system, complemented by specific support of research projects and programmes through the Science Budget. Taken together the activities supported through the Science Budget and through the UGC comprise what is conventionally known as the civil science base.

1.2 The Board's last submission to the Secretary of State - "Science Budget Allocations 1986-87 and Planning Figures 1987-88 to 1989-90" - advised on the distribution between Science Budget bodies of the £15m baseline addition to the then expenditure plans which emerged from last year's public expenditure settlement. On that occasion the Board welcomed the new money but expressed concern that it would not be sufficient to check the continuing erosion of the real value of the Science Budget.

1.3 Picking up from this point, the present submission surveys the nation's expectations of the science base; and considers how far the Research Councils generally are responding to those expectations within present financial limits, as a basis for reviewing their claims for additional funds. The Board's bid in the light of this appraisal is for a minimum increase over present Science Budget planning figures of £35m (5%) in 1987-88; of £50m (8%) in 1988-89

and £60m (10%) in 1989-90. Additionally we bid that SERC be compensated for the effect of recent exchange rate movements on the cost of its international subscriptions. The effect has been to increase these costs by £9m in 1987-88: without compensation this can only be found by further reductions in the Council's support for science.

2. Growing Demands on the Science Base

2.1 Scientific research in the Research Councils and in higher education is supported from public funds because it meets national needs. As we pointed out in the advice we submitted this time last year "the origins of the present Research Council system largely go back to war time - 1915 - and the concern of the then Government to harness scientific research to serve practical goals in defence, industry, medicine and social welfare". The belief that the Research Councils are primarily concerned with supporting pure research solely for its own sake reflects a widely held misconception about their role. In fact the Councils support research primarily because of its ultimate relevance to national needs: the needs of business for technological development to maintain its international competitiveness; and the need for solutions to practical problems - environmental, medical, social - in all sectors of the economy. Some of the work supported by the Councils is obviously relevant to national needs - in the sense that there is a generally agreed prospect of applications in the foreseeable future. But the support of research and research training which is not so obviously relevant - where the objective is to advance knowledge without any clear idea of where it will lead - is just as important in providing the basis - knowledge and skills - for more focussed work in the future.

2.2 The Board's perception is that the national needs which the science base exists to meet have become more pressing in recent years; and that these pressures are growing. In large part, the pressures come from industry. The contribution of the science base to the introduction of new, and development of existing, industrial technologies is well recognised. What is less well appreciated is that we are in a phase when industry's expectations of the

science base have increased and are continuing to increase. The background to this phenomenon, which is manifest throughout the developed economies of the west, is that the industries which helped to foster the post-World War II economic upswing - cars, electronics, consumer "white goods", semi conductors, aerospace, pharmaceuticals and petrochemicals - are now in a mature phase. Against this background, industry and national Governments throughout the developed world are seeking to develop new core or "generic" technologies which offer the promise of revitalising old industries and launching new ones to cater for new markets.

2.3 The new generic technologies - for example, biotechnology and information technology - are science based, that is to say their development is crucially dependent on further advances in basic research and related training. To this extent, the science base has a vital role to play in helping British industry maintain and enhance its technological competitiveness against the rest of the world. Concern about the already weak and arguably deteriorating competitive position of British industry increases the pressure on the science base to do its part.

2.4 There is considerable evidence that British industry, for its part, recognises the increasing importance of closer interaction with the science base, if it is to hold its own in international markets. There are, for example, recent instances of British companies recruiting leading academic scientists, in some cases complete with their entire research teams. The volume of research undertaken collaboratively between industry and the Research Councils and higher education has grown. The volume of research which industry commissions from the science base has also grown. Industry's appreciation of its growing dependence on science was also apparent in the contributions to the Secretary of State's July 1985 seminar with industrialists.

2.5 British industry is not unique in this respect. As we have already noted, increasing industrial interest in the technological potential of scientific research is a feature of the developed world as a whole. It is often remarked that foreign-owned companies are at least as actively engaged as their British counterparts in

seeking out talent and ideas on our university campuses. The national Governments of our economic competitors are equally engaged in the race to develop new industrial technologies. This increases the pressures on our science base because the publicly funded investment in science of our major economic competitors appears to have increased relative to ours - in some cases very significantly. The brain drain from the UK which we documented last year is symptomatic of the failure of our investment to keep up with that of our competitors, since scientists operate in an international market and tend to go where the best opportunities for pursuing their particular line of research exist. In this connection the Board has now seen the preliminary findings of a study which we commissioned from the Science Policy Research Unit at Sussex University of comparative public support for the science base in the USA, UK, Japan, West Germany, France and the Netherlands. The UK's per capita expenditure emerges as the lowest of all the countries studied: the UK's expenditure on its science base is also lower than all its European competitors as a percentage of GDP.

2.6 The growing dependence of the international competitiveness of UK industry on academic research puts tremendous pressure on the science base. It must seek to promote areas of research perceived as having technological potential, where the scale of investment needed is determined by the pace set by our competitors. At the same time the science base must sustain fundamental work, where there is as yet no prospect of applications, because of the likelihood that potential applications will ultimately emerge. Wherever possible the scientific community seeks to undertake research and related training in collaboration with British industry, but to the extent that the work is fundamental and the specific outcomes uncertain, industry cannot be expected to contribute significantly towards the cost.

2.7 Pressures from industry on the Research Council system mainly impact on SERC and AFRC. But other Councils have likewise been subject to pressure from "their" sectors in the national economy. Society's aspirations, as articulated in Government policies - for example for better health and a cleaner environment

at reasonable cost - depend in the shorter or longer term for their achievement on research undertaken by the science base.

2.8 The Board is the first to recognise that, while science grows rapidly, reflecting its own internal dynamic as well as the stimulus of national needs and international competition, national wealth and the resources that are thereby available from the public purse to support science do not grow at anything like the same rate. This means that the scientific community must be prepared to be more selective in its support, concentrating resources on fields where national needs are particularly pressing or where there is a strong prospect of significant returns. This kind of selectivity is increasingly being exercised within the science base: closer attention to priorities, management and value for money are at the heart of the Councils' response to the growth in the demands made of them. The following section of this submission gives more detail.

3. The Response of the Science Base

AFRC

3.1 Between 1983 and 1989-90 the AFRC will shed 2,000 posts (30%) in the course of accommodating reductions of 18% in its Science Budget allocation and of 20% in its commissioned research income. The Council is also drawing together its 24 institutes into 8 new institutes, each under a Director of Research, so as to achieve stronger central management. At the same time AFRC is reshaping its whole programme: traditionally the major pressure from the agricultural industry had been to increase production. With the emergence within the EEC of surpluses, the emphasis now is on minimising inputs (land, agrochemicals etc) so as to reduce unit costs and maintain the competitive position of British agriculture; and on devising alternative uses, both of land and of agricultural products. The Council is also building up its food research programme in response to the need - articulated by ACARD among others - for more basic work in this economically important area. The reorientation of AFRC's programme - many of its more traditional lines of research have been cut in order to reflect the changes in demand from the agriculture and food industries

- is also a response to recent rapid advances in biological research which open up new opportunities of considerable potential for agriculture and food processing.

ESRC

3.2 The ESRC has restructured its committees into inter-disciplinary boards leading to savings of £100,000 a year; and is reviewing the scope of their programmes. The Council is committed to increasing selectivity by promoting centres of excellence; and has taken decisive action through sanctions, to improve PhD submission rates. The theme of "Change in Contemporary Britain" has formed a major focus of ESRC's research programme since 1984, in recognition of the profound changes that are affecting social and economic aspects of British life, and the importance of adapting to change for our future prosperity. Within this framework the Council is promoting, for example, research into the changing structure of economic activity; the implications of new technology and its use in organisations; the functioning of markets; the attitudes of the population to changing employment patterns and the ways in which people adapt to these; job generation; the social causes of drug addiction; and science policy studies.

3.3 ESRC report rapid developments in the social sciences with increasing use of large scale data sets (eg census data, election studies) which plot social change over time and make it possible to escape from traditional disciplines and examine subjects in depth and across boundaries.

MRC

3.4 The MRC has closed 23 of their Units over the past 10 years reflecting increasingly strict management: new needs in MRC's existing programmes are being met entirely by redeployment; redeployment is additionally contributing to the cost of new MRC initiatives. The Health Departments and the National Health Service are the main customer of the MRC, on which they depend for biomedical, clinical and health services research. Social needs and demographic change have been reflected in the research

which the MRC has mounted in response to the AIDS epidemic, to the increasing size of the elderly population and to the growing problem of drug addiction. The Council is also seeking to foster clinical research, an area which has been adversely affected by funding constraints on the NHS and the universities: the Council has already introduced a scheme of clinical research professorships and readerships and is committed to introducing a new fellowship scheme that is more specifically tailored to the needs of clinical research workers. The close connection between research and clinical practice is exemplified in a number of major new programmes most notably in molecular medicine (the clinical application of molecular biology), neurobiology and nuclear magnetic resonance imaging.

3.5 While the MRC's principal links are with the NHS, it has recognised the potential for industry - drugs, medical equipment etc - to benefit from its research. Celltech has exploited and marketed a number of products derived from MRC work. The Council has now established a Centre for Collaborative Research which will provide a service for analysing problems and will channel advice and expertise to industrial, academic and clinical interests; and will sponsor collaborative projects in biotechnology and health care.

NERC

3.6. To make room for new work and to reflect the increasing capital-intensity of the science it supports, NERC is substantially reducing its directly employed manpower: over 1,000 posts are to go between 1981 and 1991-92, representing a reduction of 33%. NERC has introduced stronger central management: henceforward the programmes of its 13 institutes will be centrally managed under 3 new Directors of Science. NERC has achieved its objective of increasing the proportion of its income from commissioned research to 30%; and has succeeded in broadening its customer base. At the same time the Council is seeking to respond to a surge of interest in the environmental sciences - reflecting a heightened perception of the economic and social importance of environmental management - and to a surge of new scientific

opportunities, partly reflecting the availability of new techniques of data acquisition.

SERC

3.7 Over the last decade SERC has achieved a very significant shift in the balance of its programmes in response to industry's needs. Notably the proportion of SERC's budget spent on engineering research has more than doubled: it now accounts for 30% of the total budget. The programmes of the Council's Science Board are similarly being re-oriented, to give higher priority to the "strategic" research needed to underpin the development of new technologies. This redeployment into strategic research has been and is being achieved at the expense of other programmes: in the past 10 years the Council's astronomy, space and nuclear physics expenditure has dropped from over 60% of its budget to less than 40% - and further reductions are planned. An important part of SERC's response to industry's needs has been development of novel forms of collaboration with industry. Examples of its efforts in this area are the establishment of Directorates in strategic areas (eg Biotechnology and Application of Computer Technology in Manufacturing Industry) and the highly successful Teaching Company, ASE and Cooperative Research Grant Schemes.

4. Finance

4.1 The preceding paragraphs have briefly described the substantial amount of activity aimed at securing the better management and more effective deployment of the funds available within the Science Budget in response to changes in national needs. There is more to be done in this direction: the Board considers that the Research Councils should continue to increase their flexibility, by which we mean the capability within level or declining budgets for response to new demands. We are also concerned that Councils may not yet have fully addressed the implications for them of more selective support of UGC-funded research; and have worries about the effectiveness of inter-Council collaboration, particularly in the broad area of biology, which straddles a number of Council boundaries. But we do not accept that better management of

itself can offset the financial pressures on Science Budget bodies. Better management is about the more effective deployment of available funds: it cannot be and is not a substitute for adequate funding overall.

4.2 There is mounting evidence that the cumulative financial pressures on Science Budget bodies have reached the point where the health of the science base is already seriously affected and further seriously threatened. The Board is aware that in terms of the GDP deflator the value of the Science Budget appears to have held up well over recent years. However the GDP deflator reflects only average inflation and fails to acknowledge any of the following factors:

- i) the tendency of scientific equipment and materials costs is to rise at rates exceeding average inflation, reflecting the increasing capital-intensity of science and the availability in already capital-intensive fields of more sophisticated techniques and apparatus;
- ii) the Research Councils are incurring redundancy and other restructuring costs;
- iii) there have been significant increases in the real cost over the period of international subscriptions (which account for over 10% of the Science Budget) due both to adverse exchange movements and to rises in the UK's relative GNP (where subscriptions are GNP-related);
- iv) in contrast to Government departments which have their superannuation payments met centrally, the Research Councils have to meet annual increases in their bills for employees' superannuation which exceed average inflation.

4.3 Moreover, simple comparisons of the total Science Budget over time need to take into account the earmarking of certain additions - notably for the British Antarctic Survey and for information technology. Such additions increase the resources available in real terms but by reason of their earmarking do not increase Councils' capacity to switch resources into new fields.

4.4 We estimate that after allowing for the "relative price effect" of superannuation, restructuring and international subscription costs; and after allowing for the year on year real increase in equipment and materials costs associated with increased capital-intensity and sophistication, **the real value of the Science Budget, in terms of the volume of research that can be funded, will fall by more than 10% over the 1980s as a whole, on current Government expenditure plans.** If we additionally allow for the earmarking of programmes and the pressures of national needs, international competition and the wealth of new opportunities, the dimensions of the financial crisis with which the Science Budget bodies are trying to cope become apparent.

4.5 The strains on the system are manifest in a variety of ways including:

- i) in recent years both the number and value of research grant applications have increased, primarily in just those strategic areas where a boost in funding would be expected to lead to developments of interest to industry. However, the percentage of top quality (alpha-rated) research grant applications from the scientific community that Councils are able to fund has fallen, despite the priority which Councils have given to this mode of support;
- ii) the Board's "brain drain" survey last summer showed how talented scientists were being "poached" by overseas universities and industrial companies; and that gifted graduates in this country were increasingly turning away from scientific careers because of the perceived poor prospects;
- iii) there is widespread concern about the under-capitalisation of the science base. Industrialists who attended the Secretary of State's seminar in July 1985 expressed their concern at the equipment shortages they perceived in British universities;
- iv) there is evidence that the UK has fallen behind the international competition in a number of key fields;

v) there is a serious crisis of morale in the scientific community arising from dismay at the effects on the ground of the Government's science expenditure policies.

4.6 This submission is about the financial position of the Science Budget, not of the dual support system as a whole. We cannot ignore, however, trends in the support of research from general university funds, since this provides the basis on which Councils' specific support builds. We can only endorse the grave concern which the UGC express about the effects of the Government's expenditure policies on the general research base, which depends on a sufficiency of equipment, materials and support staff, especially technicians; and on an adequate level of academic staff time. In this latter connection, we note with particular concern the worsening of university academic staff-student ratios in science over the last few years and the further worsening that is in prospect on current expenditure plans.

5. Quantification of Need

5.1 The Board has given detailed consideration to the financial position of each of the Science Budget-funded bodies. Our scrutiny indicates a considerable and widening gap between the Government's plans for the Science Budget and the minimum provision which bodies consider is necessary if national needs are to be met. Bodies emphasised that in each case their assessment of the gap was tempered for realism and related to clearly defined economic and social needs: it was not based on the unconstrained aspirations of the scientific community. The total of bodies' claims on this basis amounted to some £35m (5%) in 1987-88 rising to £50m (8%) in 1988-89 and £60m (10%) in 1989-90.

5.2 Last year the Board advised the Secretary of State to bid in the public expenditure survey for an uplift in the then Science Budget planning figures of between 2% and 2.5% per annum. In so doing we had deliberately and to an extent arbitrarily moderated the full claims of bodies which amounted to more than double our final bid. We did this in the interest of realism, mindful of the Government's overall spending policy. Bodies' total claims

this year amount to about the same as their claims last year. Again we have pressed bodies hard on the justification for their stated claims. The justification which emerged from the interviews and associated discussions related to the cumulative effect of budgetary pressures coupled with the increasing demands described in sections 2 and 3 of this submission. Bodies' perception is that the Government's expenditure plans imply that new savings in volume have to be identified each year. Although the scope for efficiency savings has been exploited, increasingly, savings have had to be found by cutting support for scientific programmes.

Equipment

5.3 Economies have commonly been made on equipment and materials budgets because savings here can be made directly and quickly without incurring the penalty of the restructuring costs which arise when staff are shed and laboratories merged. But while economies in equipment and materials may be a useful one-off expedient, if they are not quickly restored, scientists' ability to undertake worthwhile research is permanently impaired. Indeed all the pressures on Research Councils are to increase their spending on equipment (see paragraph 4.2 (i) above).

5.4 Concern about under-funding of equipment and materials runs through Councils' Corporate Plans and their submissions to the Board. On the one hand Councils' own establishments are short of funds to replace outworn and obsolete equipment and to acquire the equipment needed for new programmes. On the other hand Councils have pared down the allowances they make for equipment and research grants to scientists and higher education: their aim in so doing has been to spread the available money as widely as possible in the scientific community. Had they not done so, the acceptance rate of alpha-rated research grant applications would have fallen further and more research teams would have been broken up, for lack of support. It is obvious, however, that this policy cannot be sustained in the longer term without producing a serious imbalance of human and capital resources.

5.5 One set of bids from Councils accordingly relates to the urgent need to restore equipment budgets both in their own institutes and in their direct support of research in higher education. AFRC, NERC, MRC and SERC have all singled out equipment shortages as demanding urgent remedy. Some of the additional money allocated last year was used to alleviate equipment shortages but the problem demands a more sustained effort. The largest single claim under this head comes from SERC which bids for £40m over the 3 years of the survey period for re-equipping university groups supported by its Science Board. SERC have said that its other Boards may submit similar bids in due course. The Science Board bid relates exclusively to equipment which the Council would usually expect to provide to leading university research teams. The items concerned (costing £50,000 each and upwards) would not normally be provided from general university funds and they are accordingly complementary to the 'stock' items which feature in the separate equipment bid which the UGC is putting forward. SERC's proposals similarly complement and extend the special UGC equipment grants scheme, which aims to re-equip a few departments, representing all fields of science and engineering, on a highly selective basis.

5.6 In scrutinising the claims related to equipment, we were conscious that a realistic response to the problem, given increasing capital intensity, must include more selective allocation of the resources available. We were generally reassured that Councils accepted this: for example the MRC in their Corporate Plan acknowledge that in order to reflect scientists' increasing needs for expensive and sophisticated equipment "whatever the financial situation a concentration of resources and certain disciplines will be essential in selected areas". Collectively bodies' equipment bids already assume that greater selectivity than hitherto will be exercised in the allocation of resources.

Scientific Opportunities and National Needs

5.7 Earlier sections of this submission have described the growth of scientific opportunities and of the external pressures which stimulate and interact with scientific development. We have also described the response of the Councils who have cut programmes

and manpower and redeployed resources, at the cost of a considerable internal upheaval, into support of the new priorities. But there are limits to how far they can go in this direction within budgets that are falling in real terms or, at best, stable. Councils' evidence plainly conveys the sense of national loss they feel at not being able to fund adequately the talent available in this country to develop key fields; and at falling so short of the investment made in competitor countries.

5.8 The AFRC estimate that they should be investing an additional £4m per annum in the important new biological programmes which they have been constrained to launch on only a very modest basis.

NERC have bid for an additional £2-3m per annum for fostering environmental science particularly in rapidly developing fields such as atmospheric chemistry. NERC also expressed general concern that the amount of basic and strategic research they can continue to support, on present plans, will become increasingly inadequate to underpin the applied contract work on which their institutes depend, on average, for 40% of their income.

5.9 The MRC estimate that they need a global addition of £5m in 1987-88 rising to £10m in 1989-90 in order to foster the talent available in growth areas such as molecular medicine and neuroscience and to help raise the quality and quantity of clinical research. SERC has bid for an addition of £6m in 1987-88 rising to £16m in 1989-90 for investment in "major growth points" in engineering and in strategic science. Among the "clear examples" which the SERC quote of "work which will be inadequately funded in relation to reasonable objectives, even assuming some benefits from internal redistribution" are: the application of computers in engineering design, processes and manufacture; optical computers; separation and purification processes; molecular electronics and low dimensional structures and devices; materials science; biological and chemical sensors; and molecular recognition and protein engineering. These are all areas of enormous interest to industry. Within current plans, some are being funded, but at sub-optimal levels; some have barely got off the ground.

The Bids

5.10 The aggregate of bodies' bids, as outlined in paragraphs 5.3 to 5.9, broadly breaks down between equipment on the one hand and scientific opportunities on the other as follows:

	£m cash		
	1987-88	1988-89	1989-90
Equipment	15	20	25
Growth areas	20	30	35
	35	50	60

Although we have not specified their needs here, these figures also take some account of claims from smaller Science Budget bodies notably the **BM(NH)** in relation to its services to the scientific community and its wider educational role in science; and the **Royal Society** in relation to its valued non-tenured university research fellowship scheme.

International Subscriptions

5.11 The figures in paragraph 5.10 do not, however, take any account of the sharp increase which the SERC is facing in the costs of their international subscriptions reflecting the fall in the value of the £ against European currencies and the relative movement of the UK's GNP. These factors present SERC with a bill for additional costs in relation to its international subscriptions which at present stands at £9m in 1987-88. Professor Mitchell has written directly to the Secretary of State about this unforeseeable cost increase which cuts savagely across the Council's attempts to plan its expenditure effectively. We share his view that the measures so far offered by Government are inadequate; and that the problem these factors present for the Science Budget should be urgently addressed by Government with the Board and SERC. Until they are solved we see no alternative but to recommend an additional bid in this year's survey for the science that would otherwise be lost.

Restructuring

5.12 We use the term "restructuring" to denote the reorganisation of physical and manpower resources to achieve one or more of a number of objectives including

- greater concentration of provision in a few well-resourced centres of excellence
- closer proximity and thereby better integration between groups in related fields (for example groups in Research Council institutes and related university research groups; or groups engaged in research and the potential users of that research);
- the redeployment of resources from lower priority to higher priority fields which may involve staff redundancy and relocation costs.

5.13 The financial pressures of recent years have provided an impetus for restructuring, particularly for the AFRC and NERC which have traditionally been largely institute-based and which have suffered significant reductions in their income from commissioned research. But the Board's view is that restructuring should not be regarded just as an emergency response to financial crises. Whatever the overall financial situation the matching of the pattern of resources to changing needs and priorities should be a continuing activity throughout the Research Council system. **The present planning figures for the Science Budget, however, allow no headroom for this kind of reorganisation which may have high costs in the short term, but would lead to benefits in the longer term.**

5.14 The MRC has given us notice of a potential restructuring bid relating to the future of the Clinical Research Centre (CRC). It has accepted the recommendations of an independent committee that, to strengthen clinical research in this country, it is necessary to create a single centre for postgraduate medical education and research; and that this should be established by merging the CRC and the Royal Postgraduate Medical School, Hammersmith on one site, with basic medical science as an integral part of the new institution. MRC is now considering, with interested parties, the feasibility of setting up the new centre; and its optimal siting.

The costs of the merger are likely to be considerable. If the outcome is a decision to press ahead with the merger, MRC will thus be seeking the Secretary of State's approval and entering a substantial additional bid against Science Budget funds. At this stage however it would be premature to make any estimate of the scale of the claim and the Board's bid, presented below, accordingly makes no allowance for it.

6. Conclusion

6.1 Our recommendation in relation to the Science Budget is for an increase over present planning figures of £35m in 1987-88 rising to £50m in 1988-89 and £60m in 1989-90 PLUS whatever is needed (some £9m at the latest reckoning) to compensate SERC for the recent increase in the costs of its international subscriptions. These sums would just about be sufficient to restore the real value of the Science Budget to its 1980 level. We are putting this bid forward as the minimum increase necessary to put the Science Budget in a position adequately to respond to national needs. We urge the Government to regard meeting the bid as a necessary investment which should yield substantial returns.

6.2 We understand that the Government's policy is to maintain and enhance the strength and quality of the science base; and acknowledge gratefully the additions to planned Science Budget expenditure that have emerged from successive public expenditure surveys, notably the baseline addition of £15m from the 1985 survey. But these additions have not been on a scale sufficient to arrest, still less to reverse, the progressive erosion of the funding of the science base both through the Science Budget and through the UGC. We believe that the time has come for the Government to consider seriously the long-term effects of its expenditure policies; and the need for a policy for the science base that states the Government's longer-term aims and intentions more clearly than can be inferred from year on year public expenditure decisions.

6.3 The long-term prospect for the science base on present expenditure trends is one of steady decline. Present trends imply that by 1990 the volume of research supported through the Science Budget alone will be some 10% less than at the beginning of the 1980s. There may well be a still greater decrease in support

for research through the UGC. The Board views this prospect with dismay. There is a striking contrast between it and the growing economic and social pressures to which the science base must attempt to respond. We cannot assume that the growing gap between the capability of the science base and national needs will be closed even partly by private funds. Our recently completed study, of the scope for extending private funding of research found that, for sound commercial reasons, industry is not prepared to commit its funds to the speculative, pre-competitive research which the science base exists to support. Although there is scope for an expansion of collaborative research with industry in strategic areas where applications are in sight, our study found that increased publicly-funded investment is the essential pre-condition for engaging more private sector funds through collaborative programmes.

6.4 Perhaps the Government envisages, as a matter of policy, the maintenance of quality at the expense of scale, leading to a publicly funded science base smaller than at present - in the number of research workers employed and the number of laboratories maintained. If this is the Government's intention we must insist that provision should be made for the substantial restructuring costs that would be essential for an orderly and planned transition to a smaller scale of operation. There is no prospect of accommodating such costs within present planning figures.

6.5 We cannot however believe that the Government regards it as sensible to reduce the research capability of an advanced industrial economy such as ours at a time of rapid technological development. We have noted earlier in this submission that the UK is already investing significantly less in civil research per capita and as a proportion of GDP than our major economic competitors. We have also noted the growing dependence of our economy on the existence of a broad-based research capability in this country which can generate the ideas, knowledge and trained people needed to translate scientific advance into technological and market leadership. The UK cannot realistically expect to lead the world across the whole range of scientific endeavour, but if we generally let other countries make the running, as is now beginning to happen, we shall impoverish the education and research training of our young people and lose any opportunity to reap for ourselves as a nation the potential commercial profits of technological leadership.

Chairman of the ABRC

14 July 1986

DEAR SIR DAVID

ABRC: 1986 PES ADVICE

Thank you for your letter of 28 April 1986 to my predecessor submitting the advice of the Advisory Board for the Research Councils on the Science Budget in relation to the 1986 Public Expenditure Survey.

I have read this with interest and I am sure it will be helpful in my discussions during the 1986 Survey. I am happy to agree that the advice should be published.

Yours sincerely

KENNETH BAKER

Chairman of the ABRC
The following information was received from the Chairman of the ABRC:

17 July 1982
The following information was received from the Chairman of the ABRC:

DEAR SIR DAVID
The following information was received from the Chairman of the ABRC:

Thank you for your letter of 12 April 1982 to my predecessor submitting the advice of the Advisory Board for the Research Council on the Science Budget in relation to the 1982 Public Expenditure Survey.

I have read this and the information submitted in relation to the 1982 Public Expenditure Survey. I am happy to agree that the advice should be published during the 1982 Survey.

Yours sincerely

KENNETH BAKER
The following information was received from the Chairman of the ABRC:

The following information was received from the Chairman of the ABRC:



