Allocation of the science budget, 1999-00 to 2001-2002 / [Office of Science and Technology].

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FOREWORD BY THE SECRETARY OF STATE FOR TRADE AND INDUSTRY THE RT HON PETER MANDELSON MP

I am glad to announce the Allocation of the Science Budget, which is designed to ensure that the Science and Engineering Base will be fit for purpose at the start of the new Millennium.

The outcome of the Comprehensive Spending Review is solid evidence that enhancing the strength of the Science and Engineering Base is a major priority for Government.

For too long, we have been living by eating our seed corn. Government saw this as unsustainable. Accordingly, the Science Budget received the largest percentage increase compared with all Departmental Budgets.

Despite the very tight financial controls that the Government has rightly set itself, some £1 billion additional public funds, including £0.7 billion for the Science Budget, have been made available to the SEB over the next three years. Coupled with a further £0.4 billion additional funding pledged by the Wellcome Trust in a ground breaking partnership, the total additional funding is £1.4 billion.

Key components of the allocations are:

- by 2001-02 the Science Budget in real terms will be some 15% above its value this year;
- the £600 million Joint Infrastructure Fund (JIF), £300 million each from the Wellcome Trust and the Science Budget, will specifically address the problems of crumbling university research laboratories and obsolete equipment identified by Dearing;
- support for highly trained people, the most important output of the Science and Engineering Base, is to be increased. People are the key to knowledge transfer. The minimum stipend for PhD students has been increased by £1000 pa, the number of Royal Society Research Fellows are to be increased from 265 to over 300, and the Royal Academy of Engineering will introduce a pilot scheme along similar lines;
- for the first time, Research Councils have been given firm allocations for three years, thus allowing them to make firm long term plans;
- PPARC's domestic programme is protected in real terms and it further benefits by a saving of about 3.75% per annum in fixed costs. Furthermore, £30 million has been reserved to protect its international subscriptions against fluctuations related to currency and net national income variations;
- all of the Councils receive more than level funding in real terms;
- increased allocations to MRC and BBSRC will allow an expansion in biomolecular and biomedical research including exploration and the subsequent exploitation of the function of the human genome;

- £20 million is allocated to the novel University Challenge fund of £40 million which will encourage universities to develop promising ideas emerging from their research into practical and exploitable propositions.

CONTENTS

INTRODUCTION

1. This booklet sets out details of the Comprehensive Spending Review (CSR) of the Science Budget, which provided some additional £700 million over three years and was part of an overall package of additional support for the Science and Engineering Base amounting to some £1.4 billion as set out in Table 1. It also explains the

policy framework and priorities that drive the allocations process to the Research Councils and other funded activities.

2. Of the additional £700 million for the Science Budget, £300 million is earmarked as the Science Budget contribution to the partnership with the Wellcome Trust, which will provide a total of £600 million for the renewal of university research laboratories and equipment. The remainder of the £700 million is available for allocation to the Research Councils and other bodies for support of research within the Science and Engineering Base (SEB). Some of this funding is for generic activities, which will result in further allocations to specific Research Councils in due course. The allocations are summarised in Tables 4 and 5 (page 13) and in more detail in Annex A (page 26).

3. The CSR involved analysis and consultation on an unprecedented scale on the Science Budget and its outcomes, both past and potential. The DGRC and his team carried out widespread consultation with Government departments, industry, Foresight panels and learned societies on the strengths, weaknesses, opportunities and threats related to Research Councils' programmes. Chief Executives, supported by their all-embracing pyramids of scientific advice were fully involved. This work involved extensive benchmarking, notably including the international comparisons published by the Chief Scientific Adviser. The Steering Group for the Science Budget CSR, chaired by the DGRC, had cross-departmental membership, including the Treasury. The Steering Group approved the CSR's analysis, which was subsequently accepted by Ministers.

4. These allocations, now announced, are in accord with the CSR's priorities. As a result of the CSR, as detailed below, the Royal Society, Royal Academy of Engineering and all Research Councils except PPARC receive increased allocations which are in excess of level funding in real terms. PPARC's domestic programme is protected in real terms but within that approximately 3.75% (totalling £11 million) of its budget is no longer absorbed by fixed costs associated with the running of the two home Observatories and is now available for its domestic programme.

The New Financial Framework

5. Before the outcome of the Comprehensive Spending Review (CSR), the Government announced a number of reforms to the regime for planning and controlling public expenditure in its Economic and Fiscal Strategy Report in June 1998.

6. In previous years the Public Expenditure Survey process (PES) resulted in a firm allocation for the forthcoming financial year with indicative planning figures being given for the following years. To remove the constraints imposed by such rigid annuality, the new procedures introduced firm three year settlements and the flexibility to carry forward allocations to subsequent years. These measures will allow greater certainty in forward planning and facilitate sensible cash management across the financial year-ends.

7. The Government has two fiscal rules:

- the golden rule whereby, over the economic cycle, it will borrow only to invest and;
- the sustainable investment rule whereby public debt as a proportion of national income will be held at a prudent and stable level over the economic cycle.

These fiscal rules mean that a greater emphasis must be placed on the distinction between capital and recurrent expenditure. The new procedures give firm allocations for the years 1999-2000 to 2001-02 for both capital and recurrent expenditure.

The Comprehensive Spending Review Settlement

8. The total settlement for the Science Budget and other related science funding is summarised in Table 1 below. ***It does not include the additional £25m for the Science Budget in 1998-99*** which was also secured in the CSR settlement.

Table 1	*£ million*				
SCIENCE BUDGET	**1998-99**	**1999-00**	**2000-01**	**2001-02**	**TOTAL**
Cash baseline	1,338	1,338	1,338	1,338	
Additional Programmes: Current: real terms		35	69	104	208
New additional		15	30	30	75
Additional Capital			40	60	100
Joint Infrastructure Fund Capital		75	100	125	300
University Challenge		10	10		20
Total Additions		135	249	320	703
TOTAL NEW SCIENCE BUDGET		**1,473**	**1,587**	**1,658**	
% increase in cash terms over 1998-99 baseline		*10.1%*	*18.5%*	*23.8%*	
% increase in real terms over 1998-99 baseline		*7.3%*	*12.7%*	*14.8%*	
Summary of Additional Funds for the Science and Engineering Base					
Total addition to Science Budget					703
Additional funds for DfEE					300
Wellcome contribution : Infrastructure fund				300	
DIAMOND				100	
					400
TOTAL					**1,403**

Capital

9. In general capital provision should not be spent on current expenditure, there is however some limited margin of flexibility to move capital into recurrent to reflect the changing breakdown of expenditure forecasts. There will be no limits for moving current spending into capital budgets. The Science budget already included some £96m in the baseline, of which some two-thirds is the capital element of research grants to Higher Education Institutes (HEIs) with the balance being capital expenditure within Research Council Institutes. The CSR settlement provided additional capital for programmes, a further £100m capital fund and £300 for the Joint Infrastructure fund.

Table 2	**CAPITAL ELEMENTS OF THE SCIENCE BUDGET £M**

	1998-99	1999-2000	2000-01	2001-02
WITHIN PRE-CSR BASELINE	**96.166**	**96.166**	**96.166**	**96.166**
Additional Capital for programmes		2.500	4.967	7.495
Additional Capital			40.000	60.000
Joint Infrastructure Fund		75.000	100.000	125.000
TOTAL CAPITAL	**96.166**	**173.666**	**241.133**	**288.661**

GOVERNMENT POLICY FOR THE SCIENCE BUDGET

10. The Science Budget, and the Science and Engineering Base (SEB) that it supports, provides a vital underpinning to a wide range of national efforts in:

- the creation of prosperity
- reducing the cost of eliminating or ameliorating the result of medical, social, food, agricultural and environmental problems
- improving the quality of life

In a recent article the Prime Minister said that the Science Base was the "*absolute bedrock of our economic performance*".[1]

11. The SEB is crucial to key priorities at the top end of education, health, social issues and modernisation. It contributes significantly to the standing of the UK in the international field, aiding UK high technology exports of goods and services, and inward investment. It is a key factor in maintaining the authority that the UK can bring to international negotiations where there is a significant science or technological basis, such as Kyoto.

12. A viable and internationally competitive research base is accepted as essential to the future industrial and commercial strength of the country, and hence also to the prosperity and well-being of the UK population.

People Base

13. The primary output from the SEB is highly trained people. Indeed a major strength of UK science lies in the PhD studentship system, which not only provides the key people for the future but also where much high quality research is done. These are the future researchers and academics who will sustain our SEB and higher education sector, as well as serve industry.

14. Until 1998 the basic stipend for most Research Council PhDs was unchanged in real terms since 1966. The additional £25m funding for 1998-99 was used in part to fund an immediate increase of £1,000 in the basic student stipend and these allocations provide, through additional provision amounting to some £12m a year, for that increase to be sustained by all Councils without the need to redirect other funds.

15. Increased funding is made available to the Royal Society to fund more University Research Fellowships for our very best young post-doctoral scientists and engineers and to boost the Dorothy Hodgkin fellowship scheme. The Royal Academy of Engineering is provided with further funds for a pilot Research Fellowship scheme.

Infrastructure

16. The *Dearing Report*[2] drew attention to the unsatisfactory situation with research infrastructure within universities. Although we have a number of outstanding teams, some very well equipped, overall Dearing found there was a need to replace a large amount of obsolete equipment if the UK were to remain at the leading edge of research. The CSR settlement made substantial provision to address these problems and there are three major initiatives designed to redress the infrastructure deficiencies:

Joint Infrastructure Fund

17. The CSR created a joint fund of £600 million to provide a 'one-off' programme towards addressing the infrastructure problems of the universities.

18. The Joint Infrastructure Fund (JIF), funded equally by the Government and the Wellcome Trust covers the full spectrum of science, engineering, economic and social sciences. It will provide for buildings, major equipment and other elements of infrastructure of the universities. The Wellcome Trust component of the Fund will, by virtue of the Trust's charitable objects, be used for infrastructure relevant to biomedical and related research facilities.

[1] Science 21 August 1998 p 1141.
[2] Report of the National Committee of Inquiry into HE July 1997

The first call for applications was issued on 1 October 1998. There will be several decision points over the next few years with the last round of decisions being taken in March 2001.

19. It will be allocated after peer review of competing bids. The first criterion will be scientific excellence but strategic priorities, as outlined in the CSR, will be relevant. The allocation will be made by a Joint Executive Committee, chaired by the DGRC (deputy chairman, the Director of the Wellcome Trust)

20. The programme's objective is to transform the working environment, and enhance the UK research community's research capability by creating a flexible scheme that can respond to the academic research community's real needs. Requests may therefore range from major refurbishment projects, through single items of equipment, to state-of-the-art buildings and facilities to house centres of national and international importance concerned with the exploitation and science-driven advancement of novel technologies. The minimum project threshold is £750k. The scheme does not of itself expand the size of the research workforce.

Joint Research Equipment Initiative

21. The Joint Research Equipment Initiative (JREI) provides equipment to Universities on the basis of a partnership in which some funds are provided by the private sector. The JREI has proved to be an outstanding success providing £80 million of equipment in the last round (JREI 97) from a public investment of £35 million. Table 3 shows the analysis by Research Council area of interest, of the public sector contribution to awards made in this round. These sums are in addition to the funds for equipment contained in the Research Council project allocation.

Table 3

RESEARCH COUNCIL AREA	EQUIPMENT FUNDING £M
BBSRC	5.7
EPSRC	19.2
MRC	5.7
NERC	1.2
PPARC	3.1
TOTAL	**34.9**

22. It is proposed to develop this initiative. £ 7m/10m/10m has been provided over the period for continuing rounds of the JREI.

Synchrotron Radiation Source (DIAMOND)

23. There is a need to replace the current high intensity X-ray Synchrotron Radiation Source (SRS) at Daresbury early in the next decade with a new facility. This instrument is an essential tool for determining structures in many areas from engineering materials through to living tissue, without which the UK Science and Engineering Base would be severely disadvantaged. A new UK facility is seen by industry as a crucial component of the continuum of basic/strategic research through to industrial exploitation.

24. The new instrument, which will be up to 10,000 times brighter than its predecessor, is necessary to help maintain the UK's position in many fields from materials research to the life sciences, especially work following on from the current genome mapping project. It will be commissioned in about five years time and will have a crucial role to play in analysing the structure and function of proteins consequently identified from the genome sequence.

25. The project to design and build this is currently estimated to cost around £175m and is being jointly funded as part of the partnership between theWellcome Trust and Government. Wellcome's contribution to the project is £110m in total. £35m has been set aside for the initial stage of the project in the current CSR allocation, which covers the first two years of the project.

Interaction With Users: Knowledge Transfer

26. A key finding of the CSR was that, while much has been done in recent years to encourage increased exploitation of Science Base outcomes, still more is needed. In particular, there is a need to increase the degree of interaction between UK firms and the Science Base, to ensure that UK firms maximise their opportunities to become fully competitive and to ensure that maximum value is realised from the public investment in the Science Base.

27. A number of schemes have been introduced including:-

- CASE, ROPA, Faraday Partnerships (Science Budget)
- TCS, LINK, (Science Budget and DTI ITS budget)
- Joint Research Equipment Initiative (Science Budget and HE Funding Councils)
- Postgraduate Teaching Partnership (PTP) (ITS Budget)

28. Each scheme was introduced to address a particular issue but they all aim to increase the level of collaboration between industry and the science base. Such schemes will only be successful if they are tailored to the needs of the companies and sectors at which they are targeted.

29. But a key aspect of exploitation of SEB outcomes is the people dimension. Without innovation there is no competitiveness and without the right people and attitudes there is no innovation. Hence, the most important pathway through which the economy derives benefit from the SEB is through the movement of people, and especially through enhancing the contact of academic researchers with commercial organisations. The principal means of knowledge transfer is by recruitment of people. For this and other reasons there is particular attention on people and the number of short term contract researchers - now 30,000.

The University Challenge Fund

30. There is a gap in the UK in the provision of finance for bringing university research discoveries to a point where their commercial usefulness can be demonstrated and first steps taken to secure their utility. These steps are necessary to reduce technical risk and determine the commercial potential of discoveries to a sufficient extent that, for example, a sound and cogent business plan can be produced and adequately supported approaches made, for instance, to funders for financial support for the commercialisation process, or to established companies to take licences to the product or process.

31. The University Challenge Fund has been set up by charities (up to £20 million, from the Wellcome Trust and the Gatsby Charitable Foundation) and the Science Budget (£20 million) to focus primarily on the exploitation of science and engineering research outcomes by enabling universities to access seed funds in order to assist the successful transformation of good research into good business. This early funding is the riskiest stage of the venture process. The funds will not necessarily be self-sustaining although it is highly desirable that they should be.

32. The scheme is open only to universities and certain research institutes. It is currently anticipated that 15-20 awards may be made, from a single round of the scheme in 1998-99.

33. The availability of seed funds can help the commercialisation process in a number of ways - financing access to managerial skills, by securing or enhancing intellectual property; by supporting additional R&D; construction of a prototype; preparation of a business plan; covering legal costs; etc. The funds are not to be used for "bricks and mortar" projects, such as building incubator units.

34. The university must normally raise at least 25% of the total University Challenge Seed Fund (referred to as a UCSF) it proposes to establish from its own resources, from alumni, industry (local or national), business angels, venture capital funds, and any other suitable contributor. Contributions to the fund should normally be donations but interest free loans may form part of the contribution. It is for the winning applicants to manage the funds to their best advantage, in line with the rules and guidelines of the scheme.

Realising Our Potential Awards (ROPAs)

35. ROPAs fund research of the researcher's own choosing. Industry does not share in the funding or definition of the ROPA project. But evidence of industrial funding for other basic or strategic research is the necessary entry ticket to the competition. Since the ROPA scheme was set up in 1994, over 1,200 awards have

been made at a total cost of over £109 million. ROPA-funded work is opening new research avenues, attracting follow-up funding from the Research Councils, industry, the EC and other sources.ROPAs fund speculative research and are not aimed at direct commercial benefits and do not involve a commercial partner but their existence provides a profound incentive for academics to develop strategic links with industry. ROPAs are available across all the scientific disciplines supported by the Research Councils.

36. ROPAs are now an established Research Council funding mechanism and as such these allocations provide for future rounds of awards to continue at the same or greater funding levels and the scope for expansion of the scheme is being explored. The recent survey[3] has revealed that ROPA projects have been particularly fruitful in producing new research avenues and that they, together with the PhD studentship programme are important vehicles for truly innovative research not subject to over conservative refereeing. **They are key components of responsive mode funding and Government wishes to see responsive mode, in general, increased even within specified priority areas.**

Foresight LINK Awards

37. As part of the LINK programme, a competition has been run for LINK projects in selected high priority Foresight areas. Provision is made for £1/2/2 million in the three years for the first round, and a further £0/1/2 million for a second round. These will be matched by funds from the DTI Innovation Budget or from another Department making a total public sector contribution to each round over three years of £10 million.

CSR Targets

38. The CSR set two new targets for the ScienceBudget over the three years to 2001-02:

- *Maintain the quality and relevance of theSEB as measured by agreed international standards.*
- *Increase by 50% the number of companies established annually as a result of the public sector science base.*

Both focus on standards and activities already inherent in the application of Science Budget funds. Internationally recognised Bibliometric measures are used to monitor the quality of the research produced by the SEB. The generation of spin-off companies is one of a range of measures designed to facilitate the exploitation of the knowledge and expertise generated within the SEB.

[3] *Realising Our Potential Award* Scheme: Outcomes Survey. OST July 1998

ALLOCATIONS TO FUNDED BODIES

Scientific Priorities

39. The CSR came at a critical time for science in the UK and, indeed, in the world. We are about to see an explosion in enabling information related to the structure of the human genome, an area in which the UK science base has been in the lead. The impact of this will be that there is a major opportunity for using this information as a basis for new and scientifically intensive industries worth £10s of billions which will both impact on quality of life and provide new openings for creating prosperity.

40. For the most part, the exploitation will be a matter for business, but they will depend on the SEB for enabling basic and strategic research and for providing the highly qualified scientists essential for such work. Initiatives designed to facilitate knowledge transfer from the SEB described above.

The Post Genome Challenge

41. The key area is the need for a major expansion in molecular, biomolecular and biomedical research. This is an area whose time has come - the recent rapid advances in genetic analysis and manipulation techniques, together with the major advances in recent years in information technology, novel synthetic and combinatorial chemistry, and in other areas, has opened up major new opportunities. Specifically, it is anticipated that the human genome will be fully sequenced by around 2005, although advances are being made almost weekly.

42. In effect, the human genome is a compendium of about 100,000 books of fundamental information - the genes. Hitherto most have remained closed. However, the amazing advances in recent years mean that early in the new millennium all 100,000 books will be accessible to anyone who has invested in the necessary skills - particularly our competitors.

43. Many of the advances in understanding human genes have depended on our understanding of the genes of primal organisms. Thus the functions of the breast cancer genes were solved by finding a related gene in yeast. Hence plant and animal genomes are crucial to the understanding of the human genome.

44. Fortunately, molecular and related sciences are areas in which the UK is already excellent, and has some world class companies operating at the forefront of the technology. The books of information are, however, not books of instruction. Rather, they will open up many areas for pre-commercial fundamental research which will be necessary before applications can be foreseen, much less seized. To be able to capitalise on the looming revelation of the human genome structure demands a major boost to our basic and strategic science capabilities, so that we (especially industry) have the necessary skills, techniques and above all, trained people able to exploit this once-in a century opportunity.

45. Molecular sciences underpin many key areas including, health care, food products, understanding impacts on the environment, and a wide range of industrial products and processes. As such this area is a priority for the science base.

IT And Communications

46. A second pervasive and profound influence on the direction of the world in the 21st Century arises from the rapid developments in IT and communications. This is also an area where the UK is strong in many areas and can capitalise on its strengths through developments that will transform the City and other aspects of electronic commerce, medicine, education and the increasingly important leisure industry. Together with the genome this area will dominate the successful economies of the 21st Century.

Ageing: EQUAL

47. Over the last 20 years, life expectancy for men and women has risen by about four years but the healthy life expectancy has remained unchanged. We therefore face the prospect that not only is the population ageing, but a greater proportion of the population will be dependant on the State through disability. A primary focus of ageing research, including umbrella programmes such as the Extend Quality Life (EQUAL) initiative, should be to extend the number of years during which individuals may expect to enjoy active, fit and participating lifestyles.

Environment And Climate Change

48. Increasingly the Government is becoming dependent on scientific advice on matters such as the environment and climate change. But the pressures are projected to grow with these sciences being so relevant to high priority problems - not just for the government but also for business and our public services. In the case of

NERC, much of the science has progressed from mostly data collection and observing, to prediction of environmental effects and the impact of possible remediation. This opens up tremendous opportunities, such as greatly improving the competitiveness of insurance and other services, generating environmentally beneficent products and processes. Government will increasingly depend on such science if it is to have confidence in initiatives to protect and improve the environment.

Social Sciences

49. Over the last few years there has been a fundamental repositioning of the social sciences within the physical and biological science base exemplified by ESRC's links with other Research Councils in innovation (EPSRC), food choice and risk (BBSRC), environmental management (NERC), health inequalities (MRC) and the social impact of information technology (EPSRC).

50. At the same time, with the collapse of central planning in Eastern Europe and increasing concerns about short -termism in Western market economics, the search is on for a sustainable "third way". Many of the big social questions which were considered settled are now being exposed to fresh thinking. In this connection there has been a remarkable synergy between the public policy agenda in Britain and major concentrations of ESRC research in such areas as: social exclusion, democratic renewal, integrated transport systems, urban re-development and the future of welfare and work.

Health of the Physical Sciences and Engineering

51. The multidisciplinary programmes of MRC, BBSRC, NERC and EPSRC described above critically depend on strong responsive mode programmes in chemistry, physics and mathematics. Without this underpinning, directed programmes, no matter how high the priority, cannot succeed. Put another way, this means that most Research Councils are in effect users ofEPSRC's basic science.

52. In most industrial processes it is the engineers that turn scientific ideas into new or improved products and processes. However, there is particular concern over the quality of the research in some university engineering departments. Here, as in all areas, there is world class research and world class teams in the UK but with engineering there is a worrying "tail" of research talent not quite up to world standards, most noticeably in chemical engineering, which of course underpins one of our strongest industrial sectors, and in biochemical engineering, which will underpin one of the major new industrial sectors of the next century.

53. One of the problems is the balance between maintaining professional engineering expertise and world class research capability. Engineering departments receive an exceptionally high percentage of their external income from industry, over two and a half that in the bio-sciences but attention needs to be paid to achieving a sound balance between professional development andconsultancy activity and leading edge research within engineering departments. That the latter is lagging emerged from the international benchmarking.

54. The Science Budget allocations take careful account of these needs, on the one hand tœnsure that impetus can be given to the priority areas, while on the other hand ensuring that the vital underpinnings are not compromised.

Summary of Allocations to Research Councils, the Royal Society and the Royal Academy of Engineering

Table 4	£ million			
	1998-99	1999-2000	2000-01	2001-02
BBSRC	185.739	198.299	202.994	208.189
ESRC	65.990	69.754	71.174	72.901
EPSRC	382.982	397.584	410.850	427.179
MRC	290.208	304.538	319.173	334.068
NERC *	168.819	178.530	181.757	187.457
PPARC *	194.220	196.306	200.687	204.228
Royal Society	22.621	23.850	24.622	25.745
Royal Academy of Engineering	3.436	3.706	4.025	4.270
TOTAL	1314.015	1372.568	1415.282	1464.037

** NERC and PPARC figures for 1998-99 have been adjusted for cash flow changes to show the underlying baseline.*

Total Additional Funding over a 1998-99 Level Cash Baseline

Table 5	£ million	
	1998-99	1999-00 to 2001-02
BBSRC	185.739	52.265
ESRC	65.990	15.859
EPSRC	382.982	86.667
MRC	290.208	90.155
NERC *	168.819	39.831
PPARC *	194.220	20.017
Royal Society	22.621	6.354
Royal Academy of Engineering	3.436	1.693

** NERC and PPARC figures have been adjusted for cash flow changes to show the underlying baseline and therefore the Table 5 figures are not directly derived from Table 4.*

Headroom

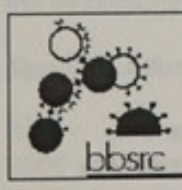
55. These allocations should be viewed against the following background:

- At the beginning of the current financial year (i.e. pre CSR) the DGRC asked Research Councils, as a matter of prudence, to plan on the basis of level cash funding for the next three years (1999-2001) Furthermore, they were asked to commit no more than 95% in the second year and 90% in the third year of these provisions. As a result of the current allocations this inflexibility has been removed.

- Further flexibility arises from the return within the new baselines of sums (total £10.5m) previously allocated to earlier initiatives, now complete.

- Further flexibility is provided by the expenditure line assigned to DIAMOND. The Councils involved. MRC, BBSRC, EPSRC and NERC, do not have to find the necessary capital funding from within their new baselines.

- PPARC's domestic programme benefits from flexibility arising out of a reduction in fixed costs associated with savings connected with the restructuring of the Observatories (3.75%, totalling £11 million).



BIOTECHNOLOGY AND BIOLOGICAL SCIENCES RESEARCH COUNCIL

Allocation

	£M	£M	£M	£M
	1998-99	1999-00	2000-01	2001-02
BBSRC	**185.739**	198.299	202.994	208.189
Cash Increase		*6.76%*	*9.29%*	*12.09%*
Real terms Increase		*4.06%*	*3.92%*	*3.98%*

Strategic Direction

56. The BBSRC supports research and related training which underpins key economic and quality of life interests in the UK - pharmaceuticals and health care, sustainable agriculture and food production, food safety, and environmental protection. The UK's science and engineering base has well-proven strength across the biological sciences. Developments in molecular biology and genomics, in particular, are leading to rapid advance from where basic research has the potential to be translated relatively quickly to - sometimes unpredicted - applications. The recent restructuring of the BBSRC's committees, subsequent portfolio review, and new arrangements for institute support have put the Council in good position to respond to, but also identify and nurture the opportunities arising. The BBSRC programmes are underpinned by the basic research in chemistry, physics, mathematics and engineering supported by the EPSRC.

Specific Allocations

57. It is particularly important that the BBSRC has the funds to respond to a sufficient proportion of the high-quality proposals originating from the science base. The increased allocation will enable the Council to increase its level of support for responsive-mode research grants over the next three years, as well as to stimulate activity in priority areas identified above and by the Council's committees which will expand and exploit the pervasive opportunities provided by the genomics revolution.

Objectives

58. New objectives for the Council over the next three years are to:

- increase the proportion of the BBSRC budget committed to responsive-mode support to enable a higher proportion of internationally competitive research to be funded;
- increase the proportion of the budget devoted to genomics research;
- integrate further its activities with MRC and EPSRC.

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

ECONOMIC AND SOCIAL RESEARCH COUNCIL

Allocation

	£M	£M	£M	£M
	1998-99	1999-00	2000-01	2001-02
ESRC	**65.990**	69.754	71.174	72.901
Cash Increase		*5.70%*	*7.86%*	*10.47%*
Real terms Increase		*3.02%*	*2.56%*	*2.48%*

Strategic Direction

59. There is an increased economic and social dimension to research carried out in other areas of the Science and Engineering base. Sustainable growth and quality of life are dependent on the behaviour of people and their response to the technology.

Specific Allocations

60. Additional funding for the *Millennium Cohort*, a new cohort to collect lifetime data on those born in year 2000 across a range of areas, has been included in the above allocation.

Objectives

61. The key new objectives for the Council over the next three years are to:

- build upon the platform of ESRC's strong relationship with the users of social science research and move it on to the next logical stage: the development, through national partnerships, of new mechanisms for evidence-based policy;

- strengthen Britain's social science base and encourage new and original thinking through increased support for research grants, doctoral studentships and key data resources;

- focus major investments on the emerging research agenda of 21st Century, which will often - as in the case of revolutionary developments in the medical and biological sciences - cross conventional Research Council and subject boundaries.

EPSRC — ENGINEERING AND PHYSICAL SCIENCES RESEARCH COUNCIL

Allocation

	£M 1998-99	£M 1999-00	£M 2000-01	£M 2001-02
EPSRC	**382.982**	397.584	410.850	427.179
Cash Increase		*3.81%*	*7.28%*	*11.54%*
Real terms Increase		*1.18%*	*2.01%*	*3.47%*

Strategic Direction

62. The EPSRC has the responsibility for ensuring the **health of the major scientific disciplines**, mathematics, physics, chemistry and engineering, which form the basis for progress across the full span of scientific endeavour. In new initiatives, it will be important to ensure that EPSRC basic programmes evolve in such a way that they contribute fully and effectively to the research of the Medical Research Council and of the Biotechnology and Biological Sciences Research Council. A vital step in this process is that the concerns and ambitions of the life sciences be fully recognised as part of the context within which the basic programmes of the EPSRC are conducted.

Specific allocations

63. The above allocations include £60 million over three years to increase those programmes that underpin those of the BBSRC, MRC and NERC including initiatives to:

- ensure that the **classical sciences underpinning progress in the life sciences are reinforced**. The application of mathematics to theoretical biology, of physics to health studies (diagnostic techniques) and of chemistry (combinatorial chemistry, biocatalysis, novel molecular synthesis, protein chemistry and structure) to the biological sector are examples of the rich and promising contributions to be made;

- encourage **multidisciplinary work at the interface between the life sciences and the physical sciences** such as:

  - ◊ the application of information technology in bioinformatics and in the data and information management associated with ongoing research in the life sciences (the Genome programme);

  - ◊ biochemical engineering where new generations of reactions must be translated to the appropriate scale and reliability;

  - ◊ the extension of materials science into organic and living systems. The ability to take advantage of greater medical understanding will, in many instances, depend upon parallel advances in materials science and engineering;

  - ◊ ensure that training schemes such as the Advanced Fellowship give full recognition to the crucial contribution of mulitdisciplinary understanding at the life sciences/physical sciences interface.

Objectives

64. Key new objectives for the Council over the next three years are to:

- enhance support for basic research in the key disciplines underpinning the programmes of BBSRC, MRC and NERC;
- enhance support for joint programmes with the BBSRC;
- enhance the support for the highest quality basic research in engineering.

MRC
Medical Research Council

MEDICAL
RESEARCH COUNCIL

Allocation

	£M	£M	£M	£M
	1998-99	1999-00	2000-01	2001-02
Medical Research Council	290.208	304.538	319.173	334.068
Cash Increase		*4.94%*	*9.98%*	*15.11%*
Real terms Increase		*2.28%*	*4.58%*	*6.79%*

Strategic Direction

65. The overall thrust of the Medical Research Council's research portfolio is to improve the health of the nation. The MRC are constrained by the need to maintain some expertise in most health areas and will continue to support research in the main fields of: molecules and cells, genetics and health, infections and immunity, public health and health services, organs and cancer, neuroscience and mental health and nutrition and environment. Within these fields, priority for new investment will be directed towards establishing the infrastructure to underpin the post genome work, encouraging research into antibiotic resistance, continuing a special programme onspongiform encephalopathies and strengthening multidisciplinary groups studying the biological and sociological processes underlying health inequalities. The MRC programmes are underpinned by the basic research in chemistry, physics, mathematics and engineering supported by EPSRC.

Specific Allocations

66. The above allocations include £12m capital to fund the creation of DNA tissue database.

Objectives

67. Key new objectives for the Council over the next three years are to:

- maintain the UK position at the forefront of post-genome research;
- enhance the evidence-base for the cost-effective provision of health care and improvement of public health;
- continue to enhance synergy with other Research Councils and the charities.

Natural Environment Research Council

NATURAL ENVIRONMENT RESEARCH COUNCIL

Allocation

	£M 1998-99	£M 1999-00	£M 2000-01	£M 2001-02
NERC	168.819	178.530	181.757	187.457
Cash Increase		*4.89%*	*7.66%*	*11.04%*
Real terms Increase		*2.23%*	*2.38%*	*3.01%*

** NERC for 1998-99 have been adjusted for cash flow changes to show the underlying baseline.*

Strategic Direction

68. NERC's top strategic priorities beyond existing priorities and the need to sustain the long term health of the science base are: climate science beyond Kyoto; and the genome and the environment. The growing importance of the climate agenda to industry and government has raised urgent new challenges for fundamental climate science. There is a need to build on the UK's current world leadership and establish new interdisciplinary capabilities.

69. There is also a need to link molecular and structural biology with ecology and evolutionary biology in programmes to interpret the genome as the molecular basis of adaptation. Such programmes will establish a new community of scientists able to capitalise on genomic data and will develop evolutionary biotechnology as an alternative to bio-prospecting for the identification of novel products.

Specific Allocations

70. New programmes will address three main areas: understanding the carbon budget and hence mitigation policies; improving regional predictions of climate change; and integrating social, economic and engineering dimensions into climate science (with ESRC and EPSRC).

Objectives

71. Key new objectives for the Council over the next three years are to:

- maintain the long term health of the science base for the sciences of the environment;
- develop a climate research agenda, including joint work with EPSRC and ESRC;
- enhance understanding of the genome and the environment.

PPARC

PARTICLE PHYSICS AND ASTRONOMY RESEARCH COUNCIL

Allocation

	£M 1998-99	£M 1999-00	£M 2000-01	£M 2001-02
PPARC TOTAL	194.220	196.306	200.687	204.228
Total Cash Increase		*1.82%*	*3.33%*	*5.15%*
PPARC - Domestic Programme	97.600	100.536	102.861	105.790
Cash Increase - Domestic Programme		*3.0%*	*5.4%*	*8.4%*
Real Terms Increase - Domestic Programme		*0.40%*	*0.21%*	*0.55%*

Cash figures are equivalent to level funding of the domestic programme in real terms.

Strategic Direction

72. PPARC funds the UK subscription to CERN and the corresponding domestic investment to allow UK scientists to participate in CERN projects, especially the Large Hadron Collider (LHC), currently under construction. Together with the British National Space Centre, the Council also pays the UK contribution to the European Space Agency (ESA). PPARC also funds ground-based astronomy programmes centred around the UK telescope sites at La Palma and Hawaii, with support from the new Astronomy Technology Centre (ATC) in Edinburgh. The UK has contributed 25% of the costs of the Gemini project, to open two new telescopes on Hawaii and in Chile in 1999 and 2000 respectively.

Specific Allocations

73. As mentioned above, the allocations maintain the domestic programme in real terms. Funds have also been reserved to cover any additional costs of the international subscriptions arising from changes in exchanges rates or relative Net National Income. Moreover, the domestic programme will benefit from the resources returned by concentrating all of the astronomy support at the ATC in Edinburgh.

Objectives

74. Key new objectives for the Council over the next three years are to:

- invest in the young scientific leaders of the future;
- maintain the UK at the forefront of astronomy by investing in new space missions, telescopes and other infrastructure;
- To maintain the leading role of UK particle physics in theoretical work, in the exploitation of existing experimental facilities, and in the construction of new detectors at CERN and elsewhere.

COUNCIL FOR THE CENTRAL LABORATORY OF THE RESEARCH COUNCILS

Allocation

	£M 1998-99	£M 1999-00	£M 2000-01	£M 2001-02
CCLRC	1.462	2.000	2.000	2.000

Strategic Direction

75. CCLRC has a key role in providing the national facilities and technical expertise for very large instruments such as neutron and synchrotron x-ray sources and lasers. CCLRC operates for the benefit and use of the UK science community at large. The direct allocation to CCLRC must be viewed in the context of the approximately £100m income it receives from other sources, including the other Research Councils, which pays for the approximately 14,000 people who use the various CCLRC facilities. The success of the above approach will be measured in terms of the service and continued increase in use of its facilities both by the science base through the other Research Councils and direct industrial and Government projects.

Specific Allocations

76. £6m over the CSR period, on projects to enhance the existing facilities, the development of better instrumentation, support functions and scoping studies into potential new fields of work for existing and potential future instruments, devices and systems.

Objectives

77. Key new objectives for the Council over the next three years are to:

- improve the service it provides by investigating the needs of the science community to target future investment;
- maintain and improve the UK's position in the provision of international standard major physics facilities for the UK science communities;
- attain at least 90% user satisfaction ratings on its performance monitors in terms of operating efficiency as measured in its user satisfaction surveys;
- attract 30% of its income from non Research Council work within 5 years.

The Royal Society

THE ROYAL SOCIETY

Allocation

	£M	£M	£M	£M
	1998-99	1999-00	2000-01	2001-02
Royal Society	22.621	23.850	24.622	25.745
Cash Increase		*5.43%*	*8.85%*	*13.81%*
Real terms Increase		*2.76%*	*3.50%*	*5.58%*

Purpose of Government Funding

78. The Royal Society is an independent body, which also acts as the agent of Government to undertake a range of programmes and initiatives. Government funding is provided to fund these specific programmes and initiatives and does not support the full range of the Society's activities.

Specific Allocations

79. Additional resources have been allocated the Royal Society's University Research Fellowship (URF) scheme which is directed towards truly outstanding people to whom the Nation will look to maintain our cadre of excellent university researchers as it diminishes through retirement (following the boost in recruitment in the 1960s). The existing 265 fellowships will be increased to 310.

80. Additional resources have been allocated to fund a further twelve *Dorothy Hodgkin Fellowships*, bringing the total to 40, aimed at providing a first career step for excellent "new" postdoctoral scientists, bearing in mind that the period immediately after the completion of the PhD is when women are most likely to drop out of careers in science and engineering.

THE ROYAL ACADEMY OF ENGINEERING

Allocation

	£M	£M	£M	£M
	1998-99	1999-00	2000-01	2001-02
Royal Academy of Engineering	**3.436**	3.706	4.025	4.270
Cash Increase		*7.86%*	*17.14%*	*24.27%*
Real terms Increase		*5.12%*	*11.39%*	*15.29%*

Purpose of Government Funding

81. As with the Royal Society, the Royal Academy of Engineering is an independent body, which also acts as the agent of Government to undertake a range of programmes and initiatives. Government funding is provided to fund this range of specific programmes and initiatives and does not support the full range of the Academy's activities. Government funding is intended to enable the Royal Academy of Engineering to reinforce success through the creation of centres of engineering excellence to promote overall quality within the SEB.

Specific Allocations

82. The above allocations include funding for increased numbers of Industrially-Linked Research Fellowships, Visiting Professorships In Engineering For Sustainable Development and Advanced Research Fellowships.

CENTRALLY FUNDED ITEMS

OFFICE OF SCIENCE AND TECHNOLOGY INITIATIVES

Public Understanding of Science

83. The OST has specific responsibilities for promoting the Public Understanding of Science, Engineering and Technology and to highlight its vital role in boosting UK competitiveness and improving the quality of life. An example of the various approaches to engaging the public is the annual SET week, where over a million people attend events throughout the country. OST's central role in encouraging best practice within the science communication community includes leading a project to develop a means for evaluating public understanding. The purpose of this is to establish a national picture of public understanding encompassing the contributions not only of organisations funded through the Science Budget but the many other private and public sector contributors.

Women In Science

84. The OST unit for the Promotion of Women in Science, Engineering and Technology provides pump-priming funds for new initiatives in co-operation with other organisations in the field.

International Collaborations

85. Provision is made for contributions to joint programmes with other governments, aimed at strengthening international scientific collaboration and promoting the exchange of ideas and information.

Secretary of State's University/Industry Partnership Prizes

86. These prizes recognise those university science and engineering departments, centres and units who have made outstanding progress in developing research partnerships with industry. Emphasis is on growth in industry funding for basic and strategic research and the prizes reward:

- successful strategies for building lasting research partnerships between UK universities and industry
- the potential of partnerships for improving the quality of life as well as benefiting the economy.

87. OST initiatives budget, which totals £2.750, £2800, £2.850 million over the period is also used for: subscriptions to international bodies; projects or schemes designed to encourage collaboration between industry and academia; reviews of specific areas of Government's policy on SET.

Superannuation Supplement

88. Prior to 1994, there were a number of separate arrangements for the payment of pensions to the Research Councils. In 1994 the Research Councils' Pension Scheme (RCPS) was established and subsumed the earlier arrangements for all of the Councils except MRC, which continues as a funded scheme. The benefits of the RCPS are analogous to those of the Principle Civil Service Pension Scheme. The RCPS, like the closed schemes which preceded it, is funded on a pay as you go basis from the Accruing Superannuation Liability Charges (ASLC) paid by the Research Councils with any shortfall being funded directly from the Science Budget. These allocations set aside £11.991, £14.368, £14.750 million for this purpose.

Exchange Rate And Contingency Reserve

89. Since 1994, variation in the ESA and CERN subscriptions caused by changes in Net National Income or exchange rates have been top sliced from the Science Budget as a whole and hence borne by all Research Councils rather than by PPARC alone. £33 million over the period has been set aside for this.

90. In 1996 agreement was reached at the ESA Council to freeze the budget of the Science Programme in cash terms for the next 5 years, and only compensate for inflation to the extent that it is above 3%.

91. As a result of a further joint UK-German initiative, it has been agreed that, compared to the 1994 agreement, the CERN budget should be reduced by 7.5% in 1997, by 8.5% in the years 1998-2000 and by 9.3% thereafter. These benefits accrue directly to the PPARC domestic budget.

ALLOCATION BY FUNDED BODY

Figure 1

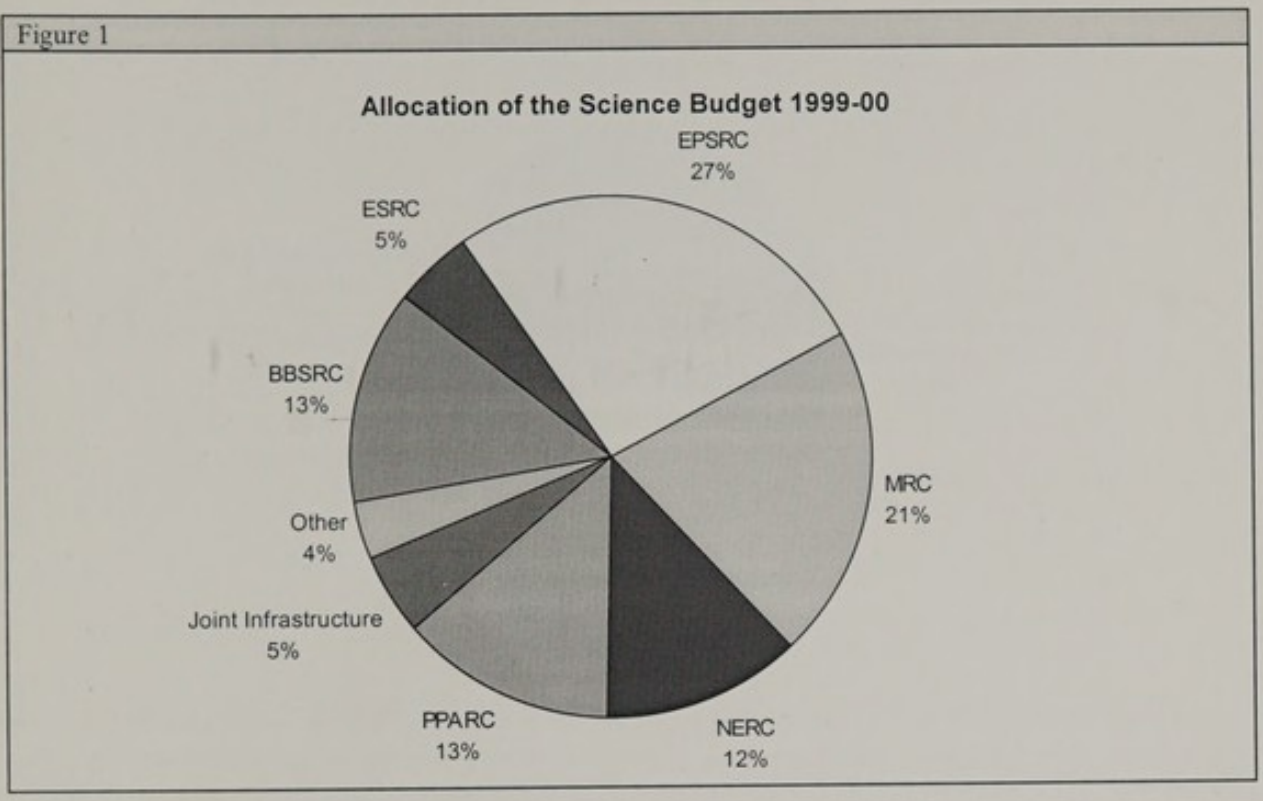
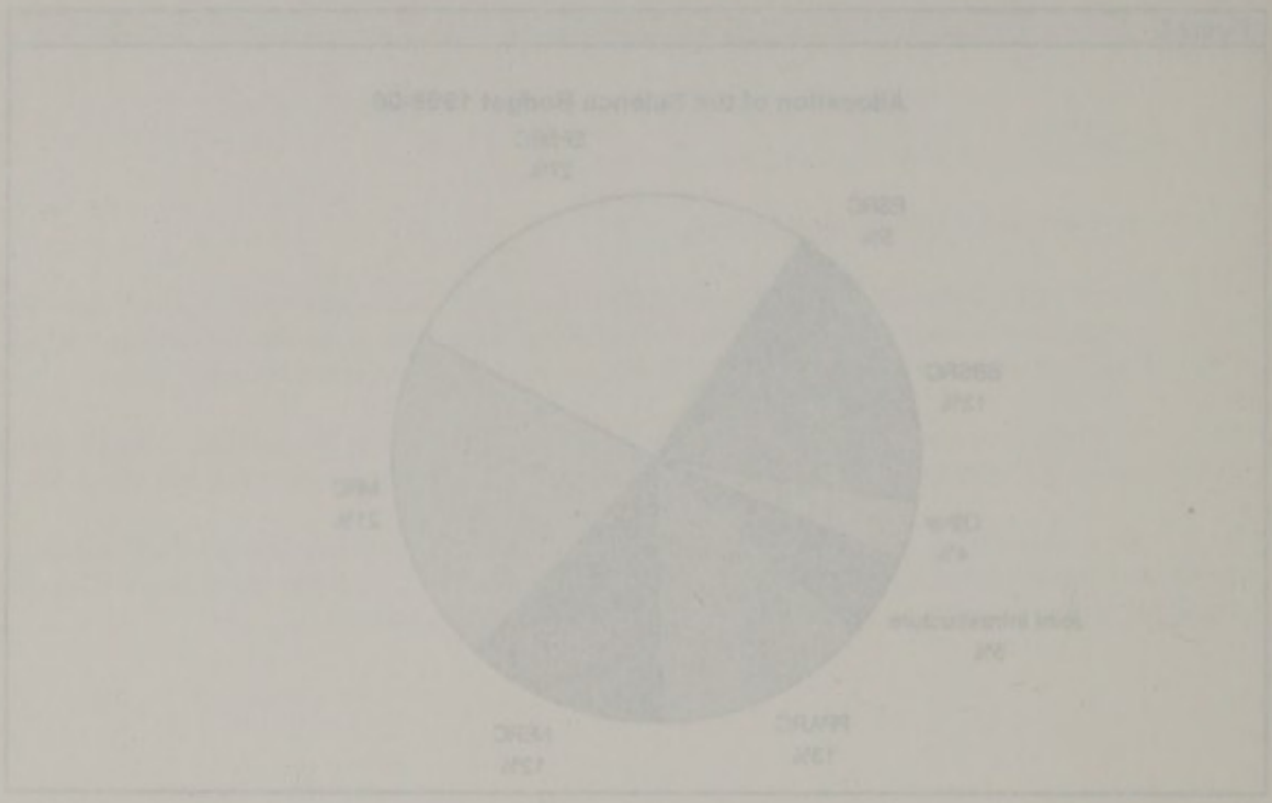


Table 1	£M	£M	£M	£M
	1998-99	**1999-00**	**2000-01**	**2001-02**
BBSRC	185.739	198.299	202.994	208.189
ESRC	65.990	69.754	71.174	72.901
EPSRC	382.982	397.584	410.850	427.179
MRC	290.208	304.538	319.173	334.068
NERC *	168.819	178.530	181.757	187.457
PPARC *	194.220	196.306	200.687	204.228
International/Contingency	3.028	(9.185)	15.000	15.000
CCLRC	1.462	2.000	2.000	2.000
Royal Society	22.621	23.850	24.622	25.745
Royal Academy of Engineering	3.436	3.706	4.025	4.270
OST Initiatives	2.376	2.750	2.800	2.850
Superannuation Supplement	12.298	11.991	14.368	14.750
ForesightLINK Awards	1.000	1.000	3.000	4.000
University Challenge	-	10.000	10.000	-
DIAMOND	-	-	15.000	20.000
Joint Research Equipment Initiative	4.147	7.000	10.000	10.000
Joint Infrastructure Fund	-	75.000	100.000	125.000
TOTAL	**1,338.326**	**1,473.123**	**1,587.450**	**1,657.637**



* NERC and PPARC figures for 1998-99 have been adjusted for cash flow changes to show the underlying baseline

ALLOCATION BY MODE OF SUPPORT

Figure 2

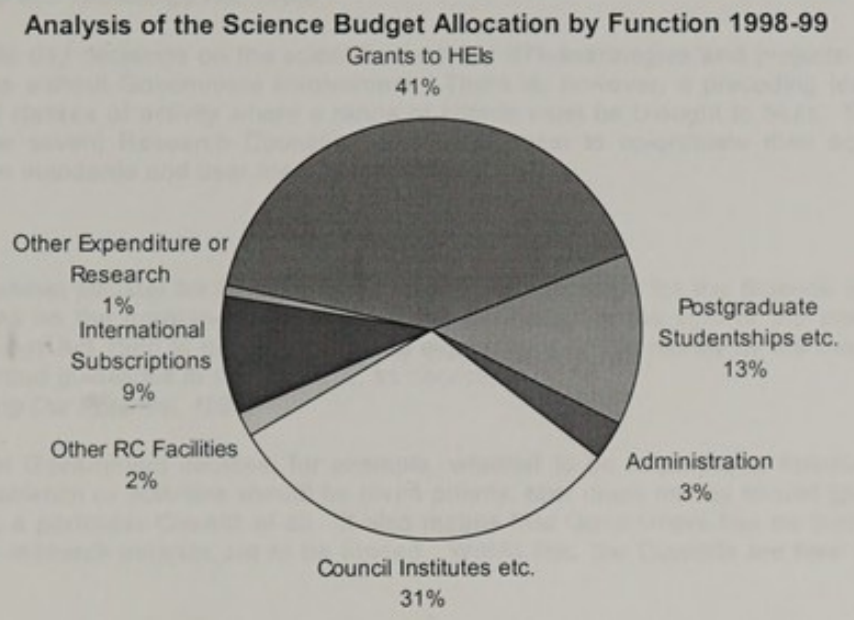
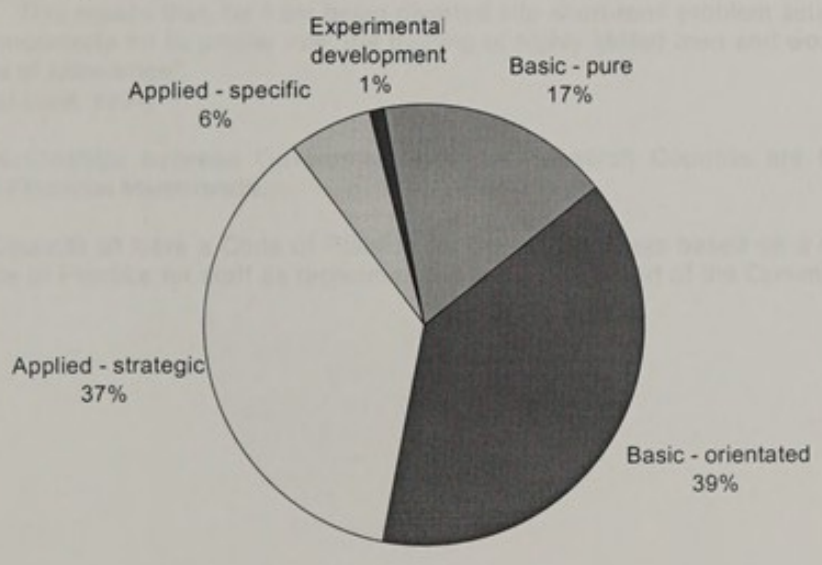


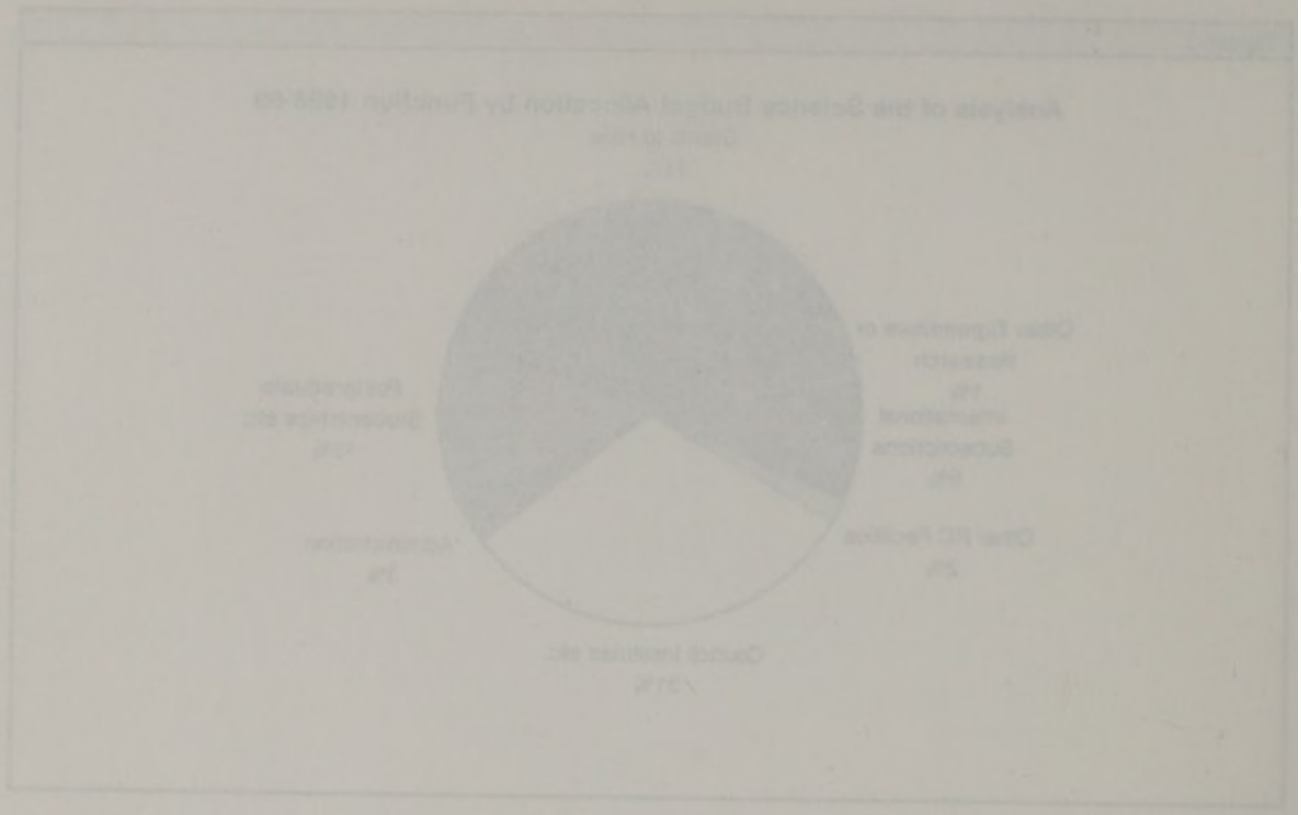
Figure 3

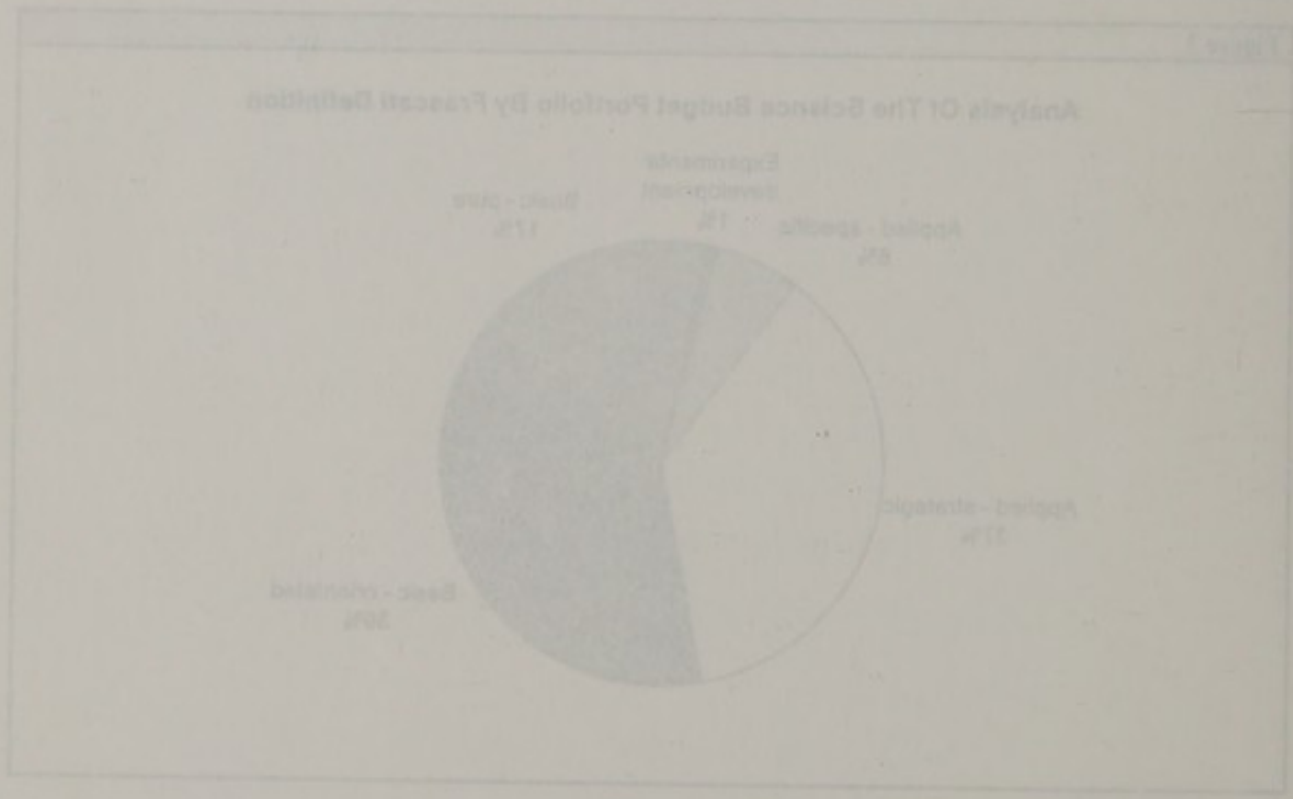


THE POLICY AND OPERATING FRAMEWORK

The policy framework for the Research Councils is determined by Government which sets broad priorities between several classes of activity. Within that framework, and in keeping with the Haldane Principle (formulated nearly 80 years ago), day to day decisions on scientific merits are taken by the Research Councils.

This system is well established and continues to be confirmed by Government. This is reflected in some key statements:





- "The Secretary of State may, out of monies provided by Parliament, pay to any of the Research Councils, such sums in respect of the expenses of the Council as he may with the consent of the Treasury determine, and so far as relates to the use of expenditure sums so paid the Council shall act in accordance with such directions as may from time to time be given to it by the Secretary of State."
  (Science and Technology Act, 1965)

- "...day to day decisions on the scientific merits of different strategies and projects should be taken by the Research Councils without Government involvement. There is, however, a preceding level of broad priority setting between general classes of activity where a range of criteria must be brought to bear. There is also a need in a system with six [now seven] Research Councils, for a mechanism to co-ordinate their activities and ensure that they apply common standards and user friendly methods."

and

- "The Cabinet Minister for Science is responsible for the strategy for the Science Budget. He will continue to make decisions on the grant-in-aid for each of the Councils. In the light of the powers given him by the Science and Technology Act 1965 to direct the use and expenditure of that money by the Councils, he will continue to be ready to issue broad guidelines to the Councils, as necessary.
  (Realising Our Potential, 1993)

That means that Government decides, for example, whether to be in particular International Collaborations, whether some broad areas of science or activities should be given priority, how much money should go to each Council and indeed whether there should be a particular Council at all. It also means that Government has no involvement in deciding which people or which particular research projects are to be funded. Within this, the Councils are free - and are expected - to set their own policies.

"Realising Our Potential" went on to say that the Government wished to harness the intellectual resources of the Science and Engineering Base to improve economic performance and quality of life. This meant that decisions on priorities for support should be more clearly related to meeting the country's needs and enhancing the nation's wealth creating capacity. Relevance should therefore be taken into account, but in a context where long-term strategic and basic research is valued.

- "This is not to say that the Science and Engineering Base should be converted into short-term problem solvers for industrial customers. Industry does not want that; and nor does the Government intend to encourage or allow such a development. Rather, the Government intends to promote an effective partnership to the mutual benefit of all parties. This means that, far from being diverted into short-term problem solving, the Science and Engineering Base must concentrate on its proper role: the training of highly skilled men and women and the conduct of research at the frontiers of knowledge".
  (Forward Look, 1994)

The working relationships between Government and the Research Councils are formalised in combined Management Statements and Financial Memoranda.

The Research Councils all have a Code of Practice for Council Members based on a model prepared by HM Treasury. They also have a Code of Practice for staff as recommended in the first report of the Committee on Standards in Public Life.