NATURAL ENVIRONMENT RESEARCH COUNCIL

ANNUAL DELIVERY REPORT 2006/2007

A new £40m royal research ship, the RRS James Cook, was formally named in February 2007 by HRH The Princess Royal.

1. Introduction

1. A Delivery Report is presented to OSI every year, reporting progress on our deliverables and targets for the three years following spending review 2004 and contained in our Delivery Plan and Scorecard. The Delivery Report complements the NERC Annual Report to Parliament, which describes selected achievements from 1 April 2006 to 31 March 2007. The Annual Report highlights NERC's progress in delivering our five-year strategy *Science for a sustainable future*. These and other NERC publications are available at www.nerc.ac.uk/publications, or call 01793 411750.

2. Overview of Achievements of the Year

2. This section provides an overview of the achievements of the year and outlines several highlights of where NERC's investments to support the UK science base has resulted in significant achievements towards meeting the Council's key priorities and science budget objectives. The examples below are grouped according to the headings in the NERC Delivery Plan 2005-2008. Further highlights can be found in the NERC Annual Report 2006/07.

Strategic Science

3. Virus causes coral bleaching

   A virus that kills algae on coral reefs may be causing widespread bleaching, according to scientists at Plymouth Marine Laboratory and the University of Plymouth.

   The virus, which kills tiny symbiotic algae essential for the survival of corals, could explain the bleaching now reported in over 50 countries and across three oceans.

   Coral bleaching is usually triggered by warmer waters. But the underlying cause of coral bleaching and the mechanisms involved have remained largely unknown, until now.

4. Do stronger winds drive more heat toward Antarctica?

   Stronger westerly winds around Antarctica are increasing eddy activity in the Southern Ocean and consequently may be driving more heat southward across the formidable Antarctic Circumpolar Current – the world's largest current.

   Eddies are the ocean equivalent of atmospheric weather systems, and in the Southern Ocean they play a key role in moving heat southward toward the Antarctic continent.

   Researchers already know that the Southern Ocean is warming rapidly. The findings from the British Antarctic Survey suggest that ocean eddies could be responsible.

5. Environmental risk of pandemic drug

   Scientists from the Centre for Ecology & Hydrology (CEH) modelled Tamiflu concentrations in river water in the UK and the US during a simulated influenza pandemic.

   Tamiflu, the antiviral flu drug recommended worldwide for the prevention of avian flu in humans, could cause serious environmental pollution as well as encourage a new strain of virus to develop if widely used.

6. Quantifying the effect of African desert storms on climate

   Saharan dust storms can block around one third of sunlight reaching the surface of the planet in affected regions, according to scientists at the Environmental System Science Centre.

An international team saw visibilities drop from 10 kilometres to 1 kilometre and felt daytime temperatures fall ten degrees Celsius in Niamey, the capital of Niger, during a large dust storm from the Sahara.

The effect on climate of small particles in the atmosphere is still a major uncertainty in climate change research.

7. Energy

Since 2005/06 NERC has built on successful activities in support of energy research. This includes: actively participating in the mid-term review of the UK Energy Research Centre (UKERC); supporting, with the Engineering and Physical Sciences Research Council (EPSRC) and UKERC, a new studentships round in energy; and the setting up of an expert group on energy in order to inform development of the new NERC Strategy and the cross-research council energy bid for CSR2007. This helped to ensure that the environmental aspects of fuel and energy extraction and use are prominent in the cross-research council bid.

Continued support for energy research is important if we are to develop sustainable, alternative ways to supply and use energy in order to reduce the UK's carbon emissions to meet national and international targets.

Responsive Funding (Blue Skies)

8. Volcanic eruption sheds light on climate uncertainties

The Mount Pinatubo volcanic eruption in 1991 is now providing vital clues as to how water vapour and clouds, two major remaining climate change uncertainties, respond when the climate system is pushed.

John Harries from Imperial College, London and Joanna Futyan from Columbia University, New York found that the atmosphere reacted quickly to the eruption, which threw large quantities of sulphur dioxide into the sky. These small particles blocked sunlight, cooling the planet. This cooling rose to a maximum within four months and consequently global humidity dropped – a warmer atmosphere holds more water vapour. Eighteen months later the climate had settled back to equilibrium.

9. Walking with dinosaurs?

A 'tree of life' tracing the history of all 4,500 mammal species on Earth shows that today's mammal diversity was not caused by extinction of the dinosaurs 65 million years ago.

The research, reported in *Nature*, contradicts the previously accepted theory that the mass extinction of the dinosaurs prompted a rise in mammal species.

The team from the Zoological Society of London, Imperial College London and the Centre for Population Biology found that modern mammals such as primates, rodents, and hoofed animals, did not diversify until at least 10 to 15 millions years after the mass extinction. A period of global warming may have been responsible for this diversification.

Cross-Cutting Science and Technologies

10. Robotic sub returns from the freezer

The UK's deep-sea robotic vehicle, Isis, successfully completed its first Antarctic mission in February 2007. Scientists onboard the research ship *James Clark Ross* were thrilled to receive the first images from the craft as it sank like a polished stone 3.5 kilometres to the seafloor.

The £4.5 million sub made 15 separate dives over three weeks to map shallow waters in Marguerite Bay, the continental shelf edge and the deep continental slope. This was the first time anyone has used a deep water remotely operated vehicle in the Antarctic.

Knowledge Transfer

11. Economic impact of NERC Science

In November 2006 NERC published a report *Economic benefits of Environmental Research*, which showed that environmental science is worth hundred of millions of pounds to the UK economy.

The independent study, carried out by PricewaterhouseCoopers, examined ten case studies and identified high-level strategic benefits for policy-makers and regulators, as well as attempting to provide quantitative direct benefits (based on guidance from HMT and OSI). Examples of the case studies used include:

- NERC supported development of the Centre for Ecology and Hydrology (CEH) flood estimation handbook, used by insurers, homeowners, policy makers and industry. Strategic benefits from this work include improved risk management and policy implementation, and the benefit to the UK economy was estimated at £7-34m per year.
- Scientists on NERC's Rapid Climate Change programme have deployed a series of instruments across the Atlantic Ocean enabling, for the first time, continuous observations of the circulation largely responsible for Europe's temperate climate. The data generated could help to improve climate prediction work by reducing uncertainty and improving risk assessment. The benefit to the UK economy was estimated as £32-36m per year.

The Government's chief scientific advisor, Sir David King, said of the study "I am very glad this analysis has taken place. One of the most difficult messages to get across at any level is where you have avoided risk or if you have significantly reduced risk. The whole issue around global warming is one of preparing our societies for the impacts of climate change. What is the economic value of avoiding those impacts? Massive."

The study was the first of its kind amongst the Research Councils and other Councils are now implementing similar projects.

12. Indian Ocean tsunami early warning system

The Indian Ocean tsunami monitoring system became operational in August 2006. Scientists at the Proudman Oceanographic Laboratory played an integral role in designing and installing crucial parts of the system around the coast of Africa and the Arabian Peninsula. Work to complete the warning system, and extend it to the Atlantic and Mediterranean, will continue throughout 2007.

As well as rapidly responding to a tsunami threat, the system will constantly monitor sea level rise.

13. Ground stability report for all UK homebuyers

Anyone buying a property in the UK will benefit from a new ground stability service launched this year. The report produced by the British Geological Survey, provides essential information for assembling the new Home Information Packs (HIPs). It gives property-specific information in simple language on the potential hazards related to natural subsidence, the impact of mining and the risk of damage from brine extraction. Insurance cover of up to £50,000 is offered with each report.

Advantages to the homebuying public include a one-stop low-cost electronic report.

14. Increasing the Economic Impact of the Research Councils

NERC is working with sister Research Councils and RCUK to implement the recommendations of the RCUK Warry action plan 'Increasing the Economic Impact of the Research Councils'

The action plan was published in January 2007 in response to a report from the Research Councils Economic Impact Group led by Peter Warry. It shows how Research Councils will work together to meet the challenges of the Warry report through provision of leadership in promoting the economic impact agenda, influencing stakeholders, working with users, and demonstrating and evaluating the impact of Research Council actions.

How we Deliver our Science

15. Commercial aircraft to help atmospheric researchers

Using commercial aircraft as atmospheric measuring platforms could soon be a reality if researchers on NERC's Upper Troposphere Lower Stratosphere Ozone programme are successful in their negotiations with the airline industry.

While aviation growth has an increasing impact on climate and local air quality, commercial aircraft also offer a unique opportunity to routinely monitor conditions in a critical region of the atmosphere.

Rod Jones at the University of Cambridge and Martin Gallagher at the University of Manchester are developing instruments for commercial aircraft to measure important gases and small particulates. They have already demonstrated that these lightweight instruments, which weigh just a few kilogrammes, are feasible for commercial aircraft use.

Trained People

16. Business plan competition

Every good business starts with two things: a good idea and a robust business plan. NERC, along with other Research Councils, provides skills, knowledge and support to entrepreneurial researchers through the business plan competition.

The competition is open to researchers from across a whole spectrum of academic research who are based in the UK's higher education institutions or public sector research establishments. After submitting a business idea, successful candidates receive a two-day training workshop in commercialisation. Highly skilled experts with experience of research commercialisation provide advice to help competitors, in the second phase of the competition, prepare a business plan. Prizes of up to £25,000 are awarded to the business plans judged to have the best potential to help turn business ideas into reality.

International Collaboration

17. International Polar Year (IPY)

The International Polar Year (IPY) is an international effort to research the polar regions in order to shed light on the impact that the Arctic and Antarctic could have on our climate. The UK is a leader of polar science and exploration and is involved in 120 of the 170 IPY science projects world-wide. Scientists either employed or grant-funded by NERC (the UK's largest funder of polar science) are involved in almost all of the UK's 120 projects. In total, we are funding polar research at over 30 UK universities and research centres.

In addition, we have provided £1 million to run the International Programme Offices for the IPY at our research centre, the British Antarctic Survey, in Cambridge.

18. Rebuilding Afghanistan's economy

Beneath an old al-Qaeda training camp close to the outskirts of Kabul, British Geological Survey (BGS) scientists and colleagues in Afghanistan have identified a vast copper

deposit that could be worth $30 billion to the war-torn country's shattered economy. The UK team of geologists has been assisting the Afghanistan Geological Survey over the past two years to interpret geological data. The group, funded by the Department for International Development, have created a detailed three-dimensional model of the deposit.

Facilities and Infrastructure

19. New atmospheric and ocean observatory on Cape Verde

    In January NERC opened a new observatory on the island of Cape Verde to provide continuous, long-term measurements of atmospheric composition above the Atlantic Ocean. The observatory will also investigate how the oceans and the atmosphere interact. The Cape Verdean Minister of Infrastructure, Transport and the Sea, Manuel Inocêncio Sousa, formally opened the centre, which is joint-funded with the Leibniz Institute of Marine Sciences in Germany and other European Union programmes.

Stakeholder Engagement

20. Major BBC documentaries

    David Attenborough's high profile documentaries *Is Planet Earth Changing?* and *Can We Save Planet Earth?* both featured our scientists in action. Viewers watched the veteran broadcaster discuss the evidence with Peter Cox, director of NERC's Climate and Land Surface Interaction Centre, and David Reay from the University of Edinburgh, as well as many other NERC-funded researchers.

    NERC scientists were also featured on other programmes including *Coast* and *Real Stories: What Is Under Your Home?.* The latter netted four million viewers and resulted in 370,000 hits on the British Geological Survey website within 90 minutes of the broadcast.

    Springwatch
    The enormous contributions from CEH scientist Tim Sparks to the BBC's *Springwatch* series has helped generate a huge revival of interest in phenology in the UK, and brought into peoples' homes the impacts of climate change on the natural world.

3. Science and Society

21. NERC is shifting the emphasis of its work in science in society to more shared working with other councils through the RCUK Science in Society Unit. Many of our existing schemes such as Researchers in Residence, CREST (Creativity in Science and Technology) and creating schools materials are delivered through the unit, and new projects, such as continuous professional development for science teachers, are working well. Late in 2006, NERC's Chief Executive Alan Thorpe became the RCUK champion for science in society, supporting and encouraging efforts to implement the science in society strategy agreed in March 2006.
22. We delayed completing a new NERC policy on science and society until the role of RCUK became clearer. Work is well advanced on developing an external communications strategy which will complement the new NERC strategy. This strategy will incorporate a revision of NERC's existing policy on science and society.
23. Our research centres continue to run a variety of engaging activities for the public, with a focus on their local audiences.
24. We ran an interesting web debate in January 2007, challenging climate sceptics. Our commitment to plain language in all our electronic and paper publications continues. Our quarterly magazine, *Planet Earth*, which is a main channel for engagement with the public, won the CIPR's award for best external magazine of the year 2006.

25. To raise communication standards still further, work is well advanced on developing both internal and external strategies which will complement the new NERC strategy. The external communications strategy will incorporate a revision of NERC's existing policy on science and society. Our research centres continue to run a variety of engaging activities for the public, with a focus on their local audiences.

26. NERC is also increasing its engagement with major stakeholders with a particular aim of enhancing our emphasis on knowledge transfer. We held a successful meeting in January 2007 which focused on developing the new NERC strategy and on strengthening our work in making our science useful to users.

4. Progress in Management

27. Delivering NERC Strategy

NERC is preparing its new strategy, due to be published in autumn 2007. NERC will translate the strategy into action at a management level and will establish the framework for setting strategic objectives and for managing performance. This framework will be a vital tool for informing decision-making at Council level.

NERC will also change its strategy delivery process to improve the way we target resources. This will give us flexibility to adapt to changing priorities. We are redefining our funding streams into national capability, research programmes and responsive research. National capability constitutes the environmental research community's long-term requirement for data, infrastructure, technology and expertise. This is essential for the UK to carry out world-leading environmental science, as well as respond to national needs and emergencies. It will include research facilities, data centres and research ships and aircraft.

28. Updated Delivery Plan and Scorecard

Each council has the opportunity to update its Delivery Plan and Scorecard each financial year. NERC has strengthened its Scorecard for 07/08 via: rationalisation, through the removal of all milestones, to allow focus on high-level priorities; smarter targets, with timescales and ownership clearly defined; and the addition of new priorities such as responding to the Warry Report. The structure of the new Scorecard is much clearer and is as a result a more suitable internal management tool and a reporting tool to OSI.

29. Leadership for NERC Programme

We have developed the Leadership Programme to strengthen capacity in the areas of strategic capability; leadership; change orientation and personal/professional impact. Some 60 senior managers from across the organisation are taking part in the programme. The initiative is helping to develop a learning culture and fostering collaboration between the various research centres across the organisation.

30. NERC's Long-Term Maintenance Plan

NERC has completed the first year of its Long Term Maintenance Plan. These works totalled £2.6million where £485k was contributed by the individual centres, and it included prioritised projects across all centres, including the National Oceanography Centre, Southampton.

Long-term maintenance is defined as work of a non-routine nature, where building or engineering elements have failed and they are beyond economical repair through general maintenance or they no longer comply with legal requirements. Replacement work does not necessarily have to be on a like-for-like basis if it can be demonstrated that alternative solutions will give lower future maintenance or utility running costs.

NERC's 25 year plan maps out the expected replacement dates of the major building elements across the entire estate. Its also provides rough budget costs for the replacement of the elements. This allows possible cost savings to be identified, and to "even out" the budget over the 25 years.

The second year of the long term plan has been approved, totalling £1.8million across all centres. It is anticipated that in the future, the Long-Term Maintenance Plan will be linked to NERC's Capital Investment Strategy.

31. Living With Environmental Change (LWEC)

NERC has led on the development of the Living with Environmental Change (LWEC) programme as part of the CSR2007 process. LWEC is a major interdisciplinary research initiative that, over 10 years, aims to provide the tools and knowledge required for us to mitigate or avoid the major impacts of environmental change. One of LWEC's strengths is that it is a research and policy partnership of 15 of the UK's main environmental research funders; through such a partnership, the programme can provide decision makers with the best information to effectively manage and protect vital ecosystem services on the time and space scales on which the economy is managed.

32. Shared Service Centre

As part of the Research Council's contribution to the Government's efficiency agenda, the Research Councils have agreed to develop and implement plans for the provision of shared services to all of the Research Councils and their institutes by 2009.

The SSC aims to provide services through a simple, standard and shared solution to deliver elements of human resources, finance, procurement, information technology, information systems and grants processing. It aims to achieve substantial savings in the cost of provision of corporate services. The initial delivery of Shared Services will commence early 2008 and implementation of a fully functional solution to all Research Councils will be delivered by the end of 2009.

NERC is taking a positive and active role in the Shared Service Centre with the aim of making it a success. In order to show our commitment to this process a new target has been added to the 2007/08 scorecard.

Changes to collaborative centres:

33. NERC Centre for Atmospheric Science

In September 2006, the NERC Centres for Atmospheric Science (NCAS) was officially renamed to the National Centre for Atmospheric Science. The name change reflects the increasing degree to which NCAS now acts as a single organisation, with one co-ordinated science plan and one management structure in place, despite being distributed geographically across many different sites. This enables a rapid response to new external (and internal) opportunities, and enhances the development of cross-cutting initiatives involving multi-disciplinary science. It also reflects the national role that NCAS plays in co-ordinating climate, weather and atmospheric composition research across the UK academic communities.

34. National Oceanography Centre, Southampton (NOCS)

In 2006 NERC began a new agreement with the University of Southampton for funding and managing NOCS. The agreement sets out the legal framework within which NOCS will operate in the future. This is complemented by a number of annexes which set out in detail how specific issues will be addressed – delegated authorities for finance, people management, intellectual property, insurances, the running of the estate, provision of library services, and so forth. The goal is to support NOCS in achieving the international standing that is worthy of a centre of excellence.

35. New Director at the British Geological Survey (BGS)

    Dr John Ludden has been appointed the next Director of the British Geological Survey (BGS), one of NERC's research centres. BGS is the world's longest established national geological survey and the UK's premier centre for earth science information and expertise. BGS carries out a wide range of research in areas such as seismic monitoring, contamination of soils and water, and technical co-operation and aid in developing countries.

5. The Gershon Efficiency Programme

36. The Research Councils are required to find annual Gershon efficiency savings of £170m per annum by 2007/2008, compared to a 2004/2005 base year. NERC's annual target is £5.71m in 2005/2006, rising to £12.12m in 2006/2007 and £17.29m by 2007/2008. Of this, 50% is required to be cashable in nature (available for reinvestment into priority areas). Overall, NERC is confident it can achieve the targets for 2007/2008.

37. During 2006/2007 NERC declared savings of £14.668m (48% cashable), comprising the following:

    i. £5,213k by increasing the level of co-funding of research;

    ii. £5,063k through the effective reprioritisation of science;

    iii. £4,160k by increasing the efficiency of NERC research centres;

    iv. £232k by centralising some financial functions and improving site utilisation.

37. Within the effective reprioritisation of research, an increase in consortia grant expenditure has resulted in a 43% increase in the number of researchers supported (over the 2004/2005 base year).

38. Research centre efficiencies includes the sale of the Charles Darwin research vessel for significantly more than original expectations, and procurement savings on the countryside data capture survey software.

39. Co-funding includes all new contract research won by NERC research centres during SR2004, demonstrating the leverage engendered by the Science Budget.

6. Progress to Date against Targets and Milestones

40. In 2006/07 the NERC Scorecard set out 81 targets for the 2004 spending review period (cascading from the 46 deliverables set out in the Delivery Plan).

41. NERC is using the Scorecard as an internal management tool as well as a reporting tool to OSI. We continue to use our in-house system, STAR (System for Targets And Risks), that not only allows us to capture information on the Scorecard and progress against targets but also important information on risk (the NERC Risk Register). As part of the quarterly reporting process, risks are seen by both NEB and the Audit Committee. The Audit Committee continues to review progress against planned progress for Business Critical projects and Top Risks, alerting NEB and/or Council to problems as appropriate.

42. We have also introduced a simple traffic-light coding system (see below) that quickly flags the status of Scorecard targets.

43. Progress against targets in 2006/2007

    NERC has performed well against its Scorecard and there have been some notable achievements in meeting or progressing towards the targets and milestones which will

enable us to meet our deliverables. Of the 81 targets, 42 are completed, 27 are green, 12 amber and 0 red.

NERC progress on targets at the end of Q4 2006/07:

Total number of targets	**81**
Red	**0**
Amber	**12**
Green	**27**
Completed	**42**

Definition of the traffic light system:

Red	**Outside boundary condition, action required.** There has been no progress on target, or, if work on the target has started, it is likely that the target will not be delivered in specified financial year. The delivery date and/or the detail in the target may have to be changed substantially.
Amber	**Some deviation from plan, action taken.** Progress is being made but the target may not be delivered on time or there have been or will be other problems. Some aspects of the work (e.g. delivery date) may have to be changed to ensure delivery of the target.
Green	**Proceeding to plan, no action required.** Progress on the target is as planned and no problems are envisaged

Green targets

44. NERC have completed, or are on target to complete, 69 (completed + green) of our targets during 2006/07. Of these there have been some notable achievements:

i. Strategic Science: Environment and human health - We have committed £4.2million of NERC funds in capacity building activities in this area. This work will help to (1) identify and prioritise the research areas and (2) grow the research community needed to tackle the “real-world”, inter and multi-disciplinary problems we face not only in the UK but globally (target 5.1);

ii. Responsive Funding (Blue Skies): NERC has committed an additional £4million to our consortium grants scheme across the Delivery Plan period (2005/06 to 2007/08). This extra investment in consortium grants has allowed us to increase expenditure by nearly 25% this year. Consortium grants support focussed, co-ordinated, collaborative research into specific issues that cannot be addressed through other NERC funding modes. They promote flexibility and collaboration by blurring the boundaries between existing NERC funding modes (target 13.1).

iii. Cross-cutting Science and Technologies: NERC has developed a Technology Management Plan, which complements the technologies theme in 'Next generation science for planet Earth', the NERC strategy for 2007-2012. It provides a framework for implementation of the technologies challenges in the overall strategy and will be published alongside it. The Technology Management Plan outlines a number of principles that will lead to a step change in NERC’s approach to technology development, encouraging a culture that values technology as a pervasive aspect of its science and underpinning the provision of scientific infrastructure (target 17.1).

iv. Knowledge Transfer: NERC has established a new Environment Young Entrepreneurs Scheme (YES), to promote commercialisation of research ideas to postgraduates and postdocs. The YES scheme, based on the successful Biotechnology YES initiative, is a three-day workshop where teams receive training on a range of skills related to commercialising their science. On the final day teams present a business plan based on hypothetical science to a panel of equity investors

to secure funding, and win a range of prizes. The winners took part in the finals of the BIOtech YES competition in December 2006 (target 41.1).

NERC has established a Partnership Research Grant scheme (under a LINK franchise) to support collaborative research with industry and public sector users. Two high quality applications were funded in our first round – moderating panels noted the excellent user involvement in the funded projects and the excellent value for money that levering matched funding achieves (target 42.1).

v. How we Deliver our Science: In April 2007 a multi-million pound strategic research programme, Oceans 2025, was launched. Oceans 2025 is a large, collaborative, research programme, funded by NERC, which aims to address fundamental issues in marine science. Knowledge of the oceans is essential to understanding and managing climate change, acidification of our seas, and sustainable use of food and energy resources. Key science priorities for the programme were identified by Defra, SEERAD and NERC.

The research programme has been designed and implemented cooperatively between seven leading UK marine centres and will allow them to pool their skills and resources to tackle, at a national level, the challenges of a changing marine environment (Target 9.1).

vi. Trained People: Enhanced stipends are now paid to joint NERC/ESRC students. The research studentships are interdisciplinary in their approach and are targeted towards the objectives and aims of LWEC and Environment and Human Health (target 23.1).

vii. International Collaboration: We have continued to explore opportunities for collaboration with China in key areas including climate change, polar science, and geological approaches to carbon storage. A number of workshops were held in the UK in 2006, following on from workshops in China in the previous year (target 25.1).

The establishment of the RCUK China office will facilitate further work to develop collaborations between the UK and China.

viii. Facilities and Infrastructure: The Princess Royal formally named the Royal Research Ship *James Cook* at a ceremony at the National Oceanography Centre, Southampton, on 5 February 2007. The £40million research ship is the latest addition to NERC's fleet and replaces the ageing RRS *Charles Darwin.* The new ship, built in Poland by a Norwegian company, Flekkefjord Slipp & Maskinbabrikk AS, will carry scientists to some of the earth's most challenging environments, from the tropical oceans to the edge of the ice sheets (target 28.1).

ix. Stakeholder Engagement: A new NERC website was implemented in September 2006. We made major improvements with a redesign and a complete overhaul of the content. The new site is helping us realise the importance of the website to both our internal and external communications, in particular our use of interactive facilities. (target 36.1).

Amber targets/milestones

45. Whilst we hope that the targets we set in the Scorecard are achievable, inevitably things will change over the year and we have to adapt our plans. In 2006/07 this has resulted in 12 amber milestones.

46. Management action has been taken against the amber targets e.g. additional resources allocated, or project deadlines extended, and, where appropriate, targets have been amended on the Scorecard. The refreshed Delivery Plan and Scorecard can be seen at

http://www.nerc.ac.uk/aboutus/planning/deliveryplan. Examples of amber targets, together with a brief description of action taken, include:

i. "15.2: Develop new techniques for exploiting Earth observation data, new satellite instrumentation and training Earth observation specialists."

This target has been rescheduled and carried over to the 2007/08 NERC scorecard. The contract for the Centre of Earth Observation Instrumentation is still under negotiation due to an issue regarding VAT. Advice has been sought, and the new target reads "15.2: In partnership with DTI, establish the new Centre for Earth Observation Instrumentation by April 2007."

ii. "29.1: Invest £38m in the construction of Halley VI and removal of Halley V (£21.5m in SR2004, of which £18m is from the Large Facilities Roadmap Funding; balance from NERC provisions and savings elsewhere)."

This target has been carried over to the new NERC Scorecard and is still considered amber. The signals from Shell about sponsorship remain positive, but the precise amount still awaits approval at their main Board level.

7. Recent Successes from Outputs 1 and 2

47. Below are some highlights from NERC's Output Framework data for 2006/2007:

- Increased number and share of world citations in environmental sciences, with UK remaining second only to USA by number (demonstrating *quality*)
- Total publications from NERC funding = 6,884 (demonstrating *scale*)
- Gershon savings of £14.66m in 2006/2007 (demonstrating *efficiency*)
- Average cost per publication = £46.9k (demonstrating *productivity*)
- Total number of PhDs funded = 996 and number of Masters funded = 386 (demonstrating *scale* for *UK newly trained people*)
- Spend on multidisciplinary grants = £24.3m, or 47% of all grant spending (demonstrating *agility* and *quality of collaborative research*)
- International co-authorship of refereed journals (ISI publications) = 44% (demonstrating *quality of collaborative research*)
- Research Centre Commissioned Research income = £43.4m (demonstrating *business and public service focus*)
- NERC economic impact study (demonstrating *business and public service focus*)

8. Future Deliverables/Targets on Outputs 1 and 2

48. During the end of 2006/2007 NERC refreshed its Delivery Plan and Scorecard for 2007/08. Some examples of Deliverables and Targets that relate to Outputs 1 and 2 are set out below:

Output 1 – A healthy UK science and engineering base

49. Target 2.6 – Scientists at The National Centre for Atmospheric Science (NCAS), one of NERC's collaborative centers, are working to increase knowledge of key environmental issues including; climate change, weather processes, and atmospheric composition including air quality. In 2007/2008 NCAS will develop the capability to perform high resolution simulations of the climate system that will enable improved assessments of

changes in climate variability, regional rainfall, weather patterns and extreme events, such as tropical cyclones. In particular, this will include improvements in the simulation of El Nino due to better representation of ocean-atmosphere coupling.

50. Target 23.2 – Alongside our other funding partners, NERC will design the specific training elements for the new interdisciplinary programme ‘Living with Environmental Change’. NERC’s training support helps provide the trained people needed to sustain environmental research and to meet the needs of stakeholders in the UK; carry out and support novel research; and provide career development opportunities for outstanding individuals.
51. Deliverable 49 – In 2007/2008 NERC will begin the replacement process for the RRS Discovery. Her replacement will be a state-of-the-art platform; enabling leading-edge multidisciplinary research.

Output 2 - Better exploitation of the research base to meet national economic and public service objectives (nb: from 07/08 this output will be known as 'knowledge exchange efficiency').

52. Target 10.5 – Scientists at NERC’s British Geological Survey (BGS) will, in 2007/2008, develop a strategy for informing stakeholders on the use of the subsurface for waste disposal.
53. Target 37.1 – In 2007/2008 NERC will actively work towards developing partnerships with key NERC stakeholders in the public and private sector to advance and disseminate knowledge and inform policy and decision-making.
54. Deliverable 50 – In 2006 the report ‘Increasing the Economic Impact of the Research Councils’ (Warry Report), was published. It celebrates the Research Councils’ achievements while also challenging Research Councils to go further, by achieving and demonstrating a step change in the economic impact of our investments. Following from this, in 2007/2008 NERC will start to take forward the Warry Report’s recommendations, as set out in the RCUK Action Plan.

9. Summary Financial Table

NERC PROVISIONAL OUTTURN 2006/07

	Forecast	Science Budget	Variance
	£m	£m	£m
RESOURCE DEL			
Income			
Pay related receipts	-20.734	-19.320	-1.414
Receipts for goods and services	-27.743	-26.680	-1.063
EU Receipts	-4.172	-3.000	-1.172
Expenditure (cash)			
Pay Costs	112.953	110.550	2.403
Current expenditure on goods and services	90.110	86.805	3.305
Current Grants			
Current grants	107.263	119.100	-11.837
Current grants - overseas	31.963	31.000	0.963
Interest on Assets			
Interest payable on finance leases (PFI)	1.401	1.401	0.000
TOTAL NEAR-CASH	**291.040**	**299.856**	**-8.815**
Non-cash			
Cost of Capital charges	7.686	8.719	-1.033
Movement in provisions	-1.382	-3.744	2.362
Impairments	0.286	0.000	0.286
Depreciation on tangibles	20.612	20.533	0.079
Profit on disposal of other assets	-2.629	-2.500	-0.129
TOTAL NON-CASH	**24.572**	**23.008**	**1.565**
TOTAL RESOURCE DEL	**315.613**	**322.863**	**-7.250**
CAPITAL DEL			
Capital Grants			
Capital grants	5.419	5.569	-0.150
Capital grants - overseas	7.800	7.800	0.000
TOTAL CAPITAL GRANTS	**13.219**	**13.369**	**-0.150**
Capital			
Additions - Buildings	12.073	13.000	-0.927
Additions - other assets	24.699	26.141	-1.442
Book value on disposal of other assets	-0.301	0.000	-0.301
TOTAL CAPITAL	**36.471**	**39.141**	**-2.670**
TOTAL CAPITAL DEL	**49.690**	**52.510**	**-2.820**

Further Financial Information

Table 1: Statement of Financial Requirement

	06/07 £'000			
	resource		capital	
Priority	plan	outturn	plan	outturn
Strategic Science				
Climate Change	36,768	33,405	1,158	2,513
Earth Life Support Systems	18,415	16,731	580	1,259
Sustainable Economies	5,890	5,351	185	403
Blue Skies	38,128	35,128	2,378	1,354
Cross Cutting Science and Technologies	114,108	113,866	31,068	33,842
Trained People	28,658	26,422		
Facilities and Infrastructure	51,386	52,387	11,677	10,319
Knowledge Transfer	7,680	6,233		
Science and Society	1,640	1,518		
Non-cash @	29,573	24,572		
TOTAL PLANNED EXPENDITURE	**332,246**	**315,613**	**47,046**	**49,690**
Science Budget	**332,248**	**325,713**	**50,065**	**50,160**
Virement to capital		**-2,850**		**2,850**
Capital loan from other Research Councils			**-500**	**-500**
2006/07 Variance	**2**	**7,250**	**2,519**	**2,820**
End Year Flexibility #	**30,104**	**7,615**	**2,231**	**2,255**
Cumulative End Year Flexibility carried forward	**30,106**	**14,865**	**4,750**	**5,075**

@ - Non-cash includes depreciation on NERC assets, cost of capital charges and future known liabilities (provisions)

- Resource outturn includes the deduction of £9.7m by the Department for Trade & Industry

Table 2: Resource budget and planned expenditure

£m

	2006/07	
	Plan	**Outturn**
Science Budget	332.248	325.713
End of Year Flexibility	30.104	7.615
Virement to capital	0.000	(2.850)
External Income	48.965	52.649
Total Resource available	**411.317**	**383.127**
Expenditure		
Science Budget Expenditure:		
Research	293.238	283.805
Training	28.658	26.422
Knowledge Transfer	7.680	6.233
Science in Society	1.640	1.518
Notional charge against capital	8.719	7.686
Depreciation	19.576	20.898
Administration costs	21.700	21.700
Total Expenditure	**381.211**	**368.262**
Overall result against budget	**30.106**	**14.865**

Table 3: Total Income

£m

Income	2006/07 Plan	2006/07 Outturn
Science Budget		
Near-cash	308.840	299.856
Non-cash	23.408	23.008
Capital Grants	14.678	13.369
Capital	35.387	39.641
includes the following elements:-		
SR2004 Additions		
Resource		
Full Economic Cost	*17.318*	*17.318*
Roberts Review	*0.821*	*0.821*
Research Council Pension Scheme	*8.099*	*8.099*
Capital		
Research Council Infrastructure Fund	*2.181*	*2.181*
Large Facilities Roadmap Funding		
James Cook Research Vessel	*8.550*	*8.550*
Halley 6 Antarctic Base	*5.080*	*5.080*
Other Additions		
Exchange Rate Compensation	*3.684*	*3.169*
CEH Restructuring	*4.300*	*2.700*
Knowledge Transfer fund	*0.980*	*0.980*
Minor baseline adjustments	*0.573*	*0.573*
Science Budget	**382.313**	**375.874**
Loan from other Research Councils	-0.500	-0.500
External Income	48.965	52.649
Total Income (excl EYF)	**430.778**	**428.023**
End of Year Flexibility	32.335	9.870
Total Income	**463.113**	**437.893**