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Evaluation of DFID's Engineering Knowledge and Research (EngKaR) Programme

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About the Authors

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Disclaimer

The views expressed in this report are those of the study team alone and not necessarily those of DFID.

Table of Contents

Summary	i
1 Introduction	1
2 Background Information	3
2.1 The Engineering Knowledge and Research (EngKaR) programme	3
2.2 About the evaluation	11
3 Evaluation Findings	14
3.1 Programme Planning	14
3.2 Programme Implementation	19
3.3 Programme Impacts	37
4 Conclusions and Recommendations	47
4.1 Theoretical and Institutional Context	47
4.2 Conclusions	50
4.3 Recommendations	57
Appendix A Study Terms of Reference	67
Appendix B Project Leader Questionnaire	71
Appendix C Biographies of Expert Reviewers	78

Summary

The Department for International Development's (DFID's) Engineering Knowledge and Research (EngKaR) programme aims to provide technical, managerial and policy solutions in the infrastructure and urban development sectors that help enable poor people to escape from poverty on a sustainable basis. It intends to solve specific problems, build capacity and communicate the solutions to others, so that the knowledge won becomes a public good and is re-used by others to generate wider development benefits. It has run in various forms since the 1980s. Over the past 15 years, it has invested over £100m across up to seven sectors in some 600 projects, mostly undertaken in collaboration between UK research institutions and partners in developing countries.

DFID commissioned this evaluation of EngKaR to support decision-making about the future of research on pro-poor infrastructure within the Research Funding Framework it set out in 2003. The evaluation tackles the way the programme has been designed and run, its results and – as relevant – opportunities for improvement.

We found that the concept of a public good knowledge and research programme is sound and that it has high potential directly and indirectly to help alleviate poverty over time through the development of capacities and improved infrastructures. The EngKaR programme design has used a modern programme management and administration process and is well regarded by participants. It has supported a collection of good quality, relevant and generally well-conducted projects in areas of great importance to international development and poverty alleviation. The projects have generally adopted pragmatic, poverty-focused, participatory approaches in researching practical aspects of infrastructure provision, maintenance and engineering appropriate for developing countries. They have produced a significant body of information, insights and guidance.

The programme has made a valuable contribution to the available body of knowledge and to DFID's (and the UK research community's) reputation in developing countries. The major benefits of the projects in country were improved infrastructural services (such as better water supply, improved transport infrastructure and improved energy usage options), environmental management and incomes. Projects induced improved planning and management capability, improved knowledge and understanding of technical issues and understanding of poverty alleviation measures. They tended to increase the capabilities of the Southern research partners.

However, the EngKaR portfolio is thematically and geographically fragmented, making it is hard for the projects to be mutually reinforcing and for them to be communicated effectively, so that others can benefit from the knowledge they generate. DFID has vigorously addressed past dissemination deficiencies through recent communications efforts but less attention has been devoted to connecting projects to larger development strategies or managing the process of realising and assessing impacts so there is potential to increase the take-up and application of the work in developing countries.

We conclude that EngKaR is an inherently sound and valuable programme whose 'public good' character offers high 'leverage' in poverty reduction. Its performance would be improved by

- Clustering projects thematically and geographically to increase the programme's 'clout' in country, and to make capacity building more cumulative
- Anchoring project design in the needs of specific beneficiaries at an earlier stage in the project life cycle
- More effectively coupling the projects to strong stakeholder interests in beneficiary countries or among donors who can ensure implementation and exploitation of results. In particular, they should be better linked to DFID's own plans and activities at country level

EngKaR already has traditional areas of strength, especially in water, energy and transport, which provide solid bases for a more focused strategy that is also consistent with DFID's climate change priority. Such a strategy needs to be led 'top down' via the aggregation of needs and DFID strategies in a small number of countries, and not (as at present) determined 'bottom-up' by the (UK) research community. The UK institutional strengths and the knowledge base built up by EngKaR, together with DFID's role as a significant donor, give the programme a solid basis for making a yet stronger contribution to poverty reduction in the future than it has in the past.

We therefore recommend that the programme be continued in a modified form. It should focus on a smaller number of themes (such as its historic strengths of water, energy and transport) in fewer countries. More detailed priorities cannot be set at a distance but must be decided in negotiation with selected DFID country offices and other stakeholders with a good understanding of needs and with the power to do something with the results of the programme. Longer-term, programmatic funding is needed to build the Southern research capacity and policy networks needed, using an instrument such as the Development Resource Centres (which is already used by DFID elsewhere). A small part of the programme budget should be reserved for responsive funding of good ideas and for studies that meet DFID's policy needs. Clearer communications strategies should be adopted at both project and programme level. More attention should be paid to monitoring and evaluating needs, project progress and impacts.

In order to protect capacity and to maintain momentum, DFID should make a clear statement on the future of the programme as a matter of urgency.

1 Introduction

This report presents the findings of an independent evaluation of the UK Department for International Development's (DFID's) Engineering Knowledge and Research (EngKaR) programme. The evaluation was commissioned by DFID's Central Research Department and was undertaken by Technopolis and the Overseas Development Institute during the period August – December 2004.

EngKaR is a centrally managed research fund, established in the 1980s. It aims to provide technical, managerial and policy solutions in the infrastructure and urban development sectors that help poor people to escape from poverty on a sustainable basis.

Although infrastructure issues (water excepted) are not mentioned in the headline Millennium Development Goals¹, the key role of infrastructure in livelihoods improvement, sustainable economic growth and poverty reduction is widely recognised². Infrastructure is key to achieving the **central** Millennium Development Goal of halving poverty by 2015. In an updated description³ of the international consensus on development, Maxwell usefully points out that, "Growth is the most important and maybe the easiest driver of poverty reduction.... Infrastructure for productive sectors, water, health and education are the priorities for public expenditure." But growth has to be environmentally as well as economically sustainable. EngKaR work, especially in energy and transport, presents an opportunity to integrate sustainability with respect to the major priority of climate change with practical knowledge and research measures to alleviate poverty by improving infrastructures.

In recognition of the important contribution that research and new knowledge can make to international development efforts, DFID has recently announced that it will be substantially increasing its funding for research in the future. In an effort to improve the effectiveness of its investments, DFID has also been changing the ways in which research is organised and managed within the Department. The creation of a Central Research Department, appointment of a Chief Scientific Advisor and launch of a new Research Funding Framework are important elements in a new era for DFID-funded research. This report represents one input into this process of change and improvement.

The report is organised into three further Sections

- **Section 2** provides background information on the EngKaR programme, covering its objectives, structure and operational activities. This section also provides background information on the aims of the evaluation and the methods used

¹ These include a target of reducing by half the proportion of people without sustainable access to safe drinking water

² See the DFID publication "Making Connections – Infrastructure for Poverty Reduction" for a recent discussion of the role of infrastructure in poverty reduction

³ Simon Maxwell, *The Washington Consensus is dead! Long live the meta-narrative!* ODI Working Paper No 243, London: ODI, 2005

- **Section 3** presents the main findings arising from the study, starting with an assessment of the programme planning phase, moving through programme implementation and ending with a discussion of the impacts of the programme
- **Section 4** presents our main conclusions and recommendations

Supporting information is presented in a series of Appendices

2 Background Information

This section describes the EngKaR programme, its projects and participants, and explains how we did this evaluation.

2.1 The Engineering Knowledge and Research (EngKaR) programme

2.1.1 Overview

DFID has run an Engineering Knowledge and Research Programme since the 1980s. Since 1990, just over £100 million has been invested through the programme, rising from a few million pounds per annum in the early nineties to almost £15 million in 2003. About 600 research projects have been funded under the programme, covering a broad spectrum of different types of studies in the engineering, infrastructure and urban development fields. In its early years the focus of the programme was very much on the development and transfer of new technologies for use in developing countries. Latterly there was a shift in emphasis, with a greater proportion of projects investigating barriers to infrastructure provision, maintenance and access, with a particular focus on sustainable solutions and pro-poor 'livelihoods' approaches and increasing involvement of southern partners in projects.

EngKaR has procured its projects through annual calls for proposals coupled to a competitive bidding process. The majority of funded projects have been North-South collaborations, with UK researchers leading teams that include a range of different stakeholders from within developing countries. Most projects have cost between £100k and £300k, and have been carried out over a two to three year period.

Throughout most of its lifetime the programme was operated and managed by DFID's Infrastructure and Urban Development Department (IUDD), but moved under the control of DFID's newly formed Central Research Department in 2003. DFID ceased commissioning new projects through EngKaR in 2004, pending the development of its new Research Funding Framework and the findings of this study.

2.1.2 Programme Objectives

As we would expect with a research programme that operated for well over a decade, EngKaR's objectives have evolved and been stated differently at different points in time. However, the primary aim of the programme throughout most of its operational life has been to provide technical, managerial and policy solutions in the infrastructure and urban development sectors that enable poor people to escape from poverty on a sustainable basis.

The logical structure of the programme, as set out in Annex B of the EngKaR 2000-2005 strategy, is reproduced in Exhibit 1 below. As part of DFID's centrally funded research, EngKaR was aimed at providing generically useful information in support of international development and poverty reduction efforts, rather than at supporting the research and development needs of individual developing countries.

Exhibit 1 Logical Structure of the EngKaR Programme

Super Goal	Poverty eliminated in poorer countries
Goal	Livelihoods of poor and vulnerable people improved sustainably
Purpose	Access to basic services and opportunities to escape poverty improved directly and underpinned by pro-poor economic growth.
Outputs	<ul style="list-style-type: none"> • Key engineering knowledge developed, adapted, improved, collated and made accessible to government agencies, the private sector, community organisations and individuals in poorer countries • Capacity of poorer countries strengthened to generate, adapt and apply engineering knowledge to encourage growth and eliminate poverty • Knowledge strategies of other development agencies influenced through long-term collaboration (World Bank, European Commission, Regional Banks, bilateral agencies, UN Agencies, etc) • Effective international networks established for sharing technology
Activities	<ul style="list-style-type: none"> • Identify critical knowledge gaps and main areas of knowledge benefit • Assess dissemination needs and opportunities and develop strategies • Select, support & monitor knowledge programmes and knowledge projects • Review knowledge programmes • Build capacity for poorer countries to manage knowledge • Liaise with other development agencies on knowledge activities • Evaluate knowledge and research programme

2.1.3 Structure

The EngKaR programme has organised its activities under a number of **Sectors**. Up until 2000 the programme addressed issues in five Sectors: Energy, Geosciences, Transport, Water & Sanitation and Urbanisation. In 2000 the programme was extended to cover two additional sectors – (1) Information & Communication Technologies and (2) Disability and Healthcare - and an additional ‘cross sectoral’ component to address cross cutting and interdisciplinary aspects.

Each of the sectors covered by the programme has been further subdivided into a small number of (usually 4-6) **Themes**. The Themes have been used to help provide more focus for the programme, describing sub-areas within each Sector where the programme has aimed to concentrate its support. For example, within the Transport Sector, one Theme relates to road safety, while another relates to improving road construction and maintenance.

The Sectors and Themes have been used as the main basis for organising and managing the programme’s activities into more manageable and coherent groups. The Sectors have been the main level at which most programme functions have been organised. For example, DFID used ‘Sectoral Advisors’ to oversee each area of the programme, and established ‘Resource Centres’ within each Sector to provide additional management support to the programme, especially with respect to dissemination of results. Sectoral and Thematic splits were also used to help organise the buying process (annual calls for proposals, appraisal and selection of proposals, etc.) and the dissemination of results (sectoral websites, annual progress reports

organised by Sector and Theme, etc.). A full listing of the Sectors and Themes is shown in **Exhibit 2**⁴:

Exhibit 2 EngKaR Sectors and Themes, 2002

Disability & Healthcare

- D1 – Improved healthcare technologies and infrastructure for poor people
- D2 – Minimising the detrimental effects of disability on the lives of poor people

Energy

- E2 - The development and promotion of renewable energy sources, especially for rural communities
- E3 (incorporating previous theme E1) – The more efficient supply, conversion and use of energy
- E4 - Improved access to clean energy in poorer households
- E5 (discontinued and incorporated across all other Themes) – Institutional aspects
- E6 – Reducing the environmental impacts of energy use

Geoscience

- G1 - Promote environmentally sensitive mineral resource development
- G2 - Improve geological, geochemical & geotechnical hazard avoidance strategies in devt planning
- G3 – Improve understanding of waste, toxic effects, of minerals and environmental health in geological resource development and develop strategies and techniques for cost effective mitigation in the context of developing countries
- G5 - Development strategies and systems for maintaining and improving national geoscience information services

Information Communication & Technology (ICT)

- I1 – The appropriate use of ICT for poorer communities in rural areas
- I2 - Reaching poorer people in urban and peri-urban areas
- I3 – Inclusive enabling environments
- I4 – ICT’s role in achieving specific International Development Goals

Transport

- T1 - Improve transport safety and reduce the impact of accidents particularly for poor people in rural and urban areas
- T2 - Reduce the costs of construction, rehabilitation and maintaining road infrastructure to help reduce vehicle operation costs
- T3 - Improve the mobility of rural and urban poor for meeting their livelihood needs
- T4 - Increase the efficiency of national and regional transport systems whilst safeguarding the interest of poor and vulnerable users.

Urbanisation

- U1 - Increase the access of low income households and the poor to adequate, safe and secure shelter
- U2 - Increase the access of low income households and the poor to improved urban services
- U3 - Enhance the effectiveness of city and municipal planning and management
- U4 – Improving urban governance and management for the benefit of the poor
- U5 – Improving knowledge transfer, dissemination and communication
- U6 – Improving livelihoods, local and regional development

Water and Sanitation

- W1 (incorporating previous theme W2) – Water Resources Management (Improved assessment, development and management of water resources)

⁴ Taken from the EngKaR 2002 Progress Report

- W3 – Combating Degradation of Water Resources (Increased protection of water resources, water quality and aquatic eco-systems)
- W4 – Water and Sanitation (Raise the well-being of the rural and urban poor through cost effective improved water supply and sanitation)
- W5 – Water for Sustainable Food Production (Improve availability of water for sustainable food production and rural development)

Cross Sector

- X1 – Addressing cross-cutting technical and non-technical issues
- X2 – Addressing the links between infrastructure and urban sectors and other disciplines
- X3 – Proposals that provide practical methods for improving demand for communication of and uptake of research within and external to IUDD sectors

2.1.4 Funding modes

Since the beginning of the 1990s the EngKaR programme has funded most of its projects through a competitive bidding process, with DFID issuing annual calls for proposals and research performers preparing and submitting ideas for research projects, which are then assessed and selected in competition with each other. In addition to this primary ‘funding mode’, DFID has directly commissioned a small number of studies and has used part of the budget for externally contracted ‘management support’ activities. However, the vast majority of awards were made on a competitive basis.

In 2000, DFID published a new strategy for the EngKaR programme, which set out three mechanisms that would be used to fund projects from that point on

- **Innovation Fund** – This was in effect the same mechanism that had been used historically to fund EngKaR projects, with an annual call for proposals under each of the Sectors and a competitive appraisal and selection process leading to project awards. The majority of projects commissioned through this route cost in the range £100k to £400k and last up to three years
- **Directed Activity** – Introduced in 2000 as a mechanism directly to commission projects that address specific priority knowledge gaps identified by newly formed Specialist Advisory Groups, the intention was that this mechanism would account for at least a third of the budget by 2004. However, in practice very few projects have actually been commissioned via this route as the process of identifying which specific projects are needed was not fully developed
- **Responsive fund** – A flexible mechanism to address new or cross-cutting ideas, opportunities that require timely action or actions which fall outside current Themes. The responsive fund was to be used for smaller projects, with up to 5% of the programme budget allocated through this mechanism. No projects have officially been commissioned through this route since it was announced in 2000

2.1.5 Research Projects

As already indicated, the programme’s objectives have been pursued primarily through fully funded research projects undertaken by UK organisations in collaboration with partners in developing countries. The projects have been procured through annual calls for proposals operated on a fully open and competitive basis. Exhibit 3 below shows the total number of projects launched within each sector of the programme over the period 1990 - 2004. It indicates that the Water & Sanitation

Sector is the largest area of the programme, making up over a third of the total with over 200 projects launched. Transport and Urbanisation are the next two largest Sectors, collectively comprising a third of the overall total number of projects. The other five Sectors make up the remaining third of the portfolio.

Exhibit 3 also shows the time periods over which each Sector was launching new projects and the average numbers of new projects launched per annum. The five main sectors (Water & Sanitation, Transport, Urbanisation, Energy and Geoscience) have been in operation since the early nineties, with the other three Sectors only coming on stream much more recently. The Water & Sanitation Sector is the leading area in terms of new projects per annum, with a mean annual total of 14. The other Sectors have averaged between 4 and 8 new projects per annum for the years in which new projects were actually launched.

Exhibit 3 Number of EngKaR projects, by Sector

EngKaR Sector	Number of projects	Share of projects	Time period in which projects launched	Average no. of new projects per annum
Water and Sanitation	216	36%	1990 - 2003	14*
Transport	105	18%	1990 - 2004	7
Urbanisation	91	15%	1990 - 2004	6
Energy	83	14%	1992 - 2003	7
Geoscience	53	9%	1992 - 2003	4
ICT	22	4%	1999 - 2004	4
Disability & Healthcare	23	4%	2001 - 2003	8
Cross sectoral	4	1%	2002	4
Total	597	100%	1990 – 2004	38*

*These figures have been adjusted as 25 of the Water projects in the portfolio were launched in the late 1980s

Exhibit 4 sets out the costs (to DFID) of the projects that have been supported within each Sector. It shows that just over £107 million has been invested by DFID, almost all (96%) of which has been allocated to projects within the five main Sectors that have operated since the early nineties. The Water & Sanitation and Transport Sectors have dominated the spend profile, collectively consuming 60% of the total.

Exhibit 4 also presents the average costs per project, overall and by Sector. It reveals that EngKaR projects have averaged £184k each overall, with some significant differences from one Sector to the next. The average project cost has been highest in the Transport (£222k) and Geoscience (218k) Sectors, and lowest in the Disability & Healthcare (£63k) and Cross-sectoral (£90k) areas.

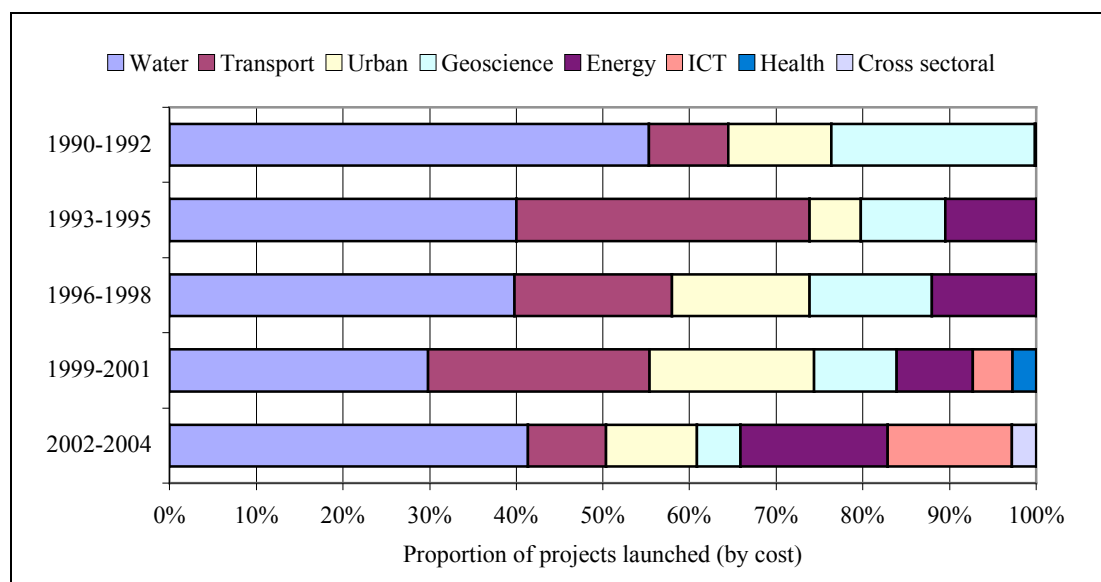
Exhibit 4 Costs of EngKaR projects, by Sector

EngKaR Sector	DFID funding	Share of funding	Number of projects*	Average project cost
Water and Sanitation	£42,154,956	39%	214	£196,986
Transport	£23,111,214	21%	104	£222,223
Urbanisation	£14,974,048	14%	91	£164,550
Energy	£10,956,208	10%	83	£132,003
Geoscience	£11,349,022	11%	52	£218,250
ICT	£3,637,017	3%	21	£173,191
Disability & Healthcare	£1,067,881	1%	17	£62,817
Cross sectoral	£359,159	0%	4	£89,790
Total	£107,609,505	100%	586	£183,634

* Projects where cost data is not available have not been included in this table

Exhibit 5 shows graphically the proportion of projects (by cost) launched within each Sector during each three-year period of the programme's operations. From it we can see the changing balance of activity across the Sectors over time. The early '90s were dominated by work in the Water & Sanitation area (over 50% of the total) though by the mid 90s the amount of work funded in Transport was almost as large. In the late '90s there was much more balance across the five main sectors, though Water & Sanitation still dominated. From 1999 onwards, new Sectors were introduced, but as Exhibit 5 shows these have made up only a very small fraction of the overall total. The bulk of the accumulated knowledge of the programme is in the traditional sectors.

Exhibit 5 Proportion of projects launched over time, by Sector



The projects themselves rarely involve 'research' in the sense of developing new, fundamental knowledge or theory. Rather, they tend to involve the extension and application of existing knowledge, which often involves adapting it to a new context. Often they involve action-research, again because of the need to interact with the context in order to make them succeed. Significant numbers of projects address

policy needs or the creation of management and organisational, as well as technical, capabilities. For example, there are some water-related projects that deal with building and testing safe water supplies and others that deal with the management and governance of water supply organisations. Some projects map and measure. Most have a strong focus on ‘how to’ questions, rather than simply providing facts. While some projects produce artefacts, many make guidelines or handbooks. As we understand it, the programme’s title ‘Knowledge and Research’ is intended to reflect its role in making research-based knowledge accessible.

One successful project⁵ tackled the fact that it is typically expensive to connect poor households to electricity distribution networks. Slum or shanty dwellers are further disadvantaged, since utilities are reluctant to invest in connecting people who do not have a legal right to live in their dwellings. They are often forced to use traditional fuels that cause pollution and ill health. The project helped develop lower-cost connection technology and tackled ways to enable utilities to contract with slum dwellers. It attracted interest from another donor and from electricity suppliers, making sure that other stakeholders had interests in more widespread implementation once the project itself was concluded.

Another project⁶ tackled the need quickly to provide safe sanitation when large numbers of people suddenly need shelter, as in a refugee camp or following a natural disaster. Working with the major international aid organisations that tend to be involved in such situations, it prepared guidelines and checklists to support field workers setting up sanitation facilities, developed training courses and used a mixture of international and local NGOs to ensure the resource packs and trained people are accessible in the field. Involving organisations such as the International Federation of Red Cross and Red Crescent Societies is expected to help ensure that the products of the project are used long after the project itself finishes.

2.1.6 Research Performers

Just over 130 organisations have led EngKaR projects, and many more have been involved as formal project partners or subcontractors. Exhibit 6 shows the ‘top-ten’ organisations in terms of the number of EngKaR contracts they have held as lead partner. The Exhibit also shows the main Sector(s) that each organisation has worked in (in brackets), the total amounts of DFID funding provided across their projects, and the associated average cost per project for each organisation.

The ten organisations listed in Exhibit 6 have collectively led over half of all EngKaR projects, indicating that the programme has spent a large proportion of its funds through a relatively small number of ‘key’ research performers. These core participants are a mix of public and private research institutes and laboratories, universities, non-governmental organisations (NGOs), and private consultancies, and are the leading research groups nationally. They represent both a major sunk cost and a strong set of knowledge and capabilities relevant to EngKaR. Among the other 120+ organisations that have led projects are several charities, international donors and aid agencies, engineering firms, and so on. From 2001, as part of the process of untying research, the programme was opened up so that organisations from outside

⁵ R8146

⁶ R6873

the UK could apply for projects and receive funding without the need for a UK partner to be involved.

Exhibit 6 Main EngKaR research performers

Organisation	Number of projects	Total funding	Average funding per project
Transport Research Laboratory (T)	74	£ 17,571,382	£ 237,451
British Geological Survey (G / W)	54	£ 9,762,332	£ 180,784
University of Loughborough (W)	41	£ 7,508,972	£ 183,146
ITDG [including ITC] (E / U)	37	£ 6,948,147	£ 187,788
HR Wallingford (W)	34	£ 9,295,280	£ 273,391
Institute of Hydrology (W)	14	£ 2,416,738	£ 172,624
AEA Technology (E)	13	£ 2,617,961	£ 201,382
Gamos Ltd (E / ICT)	13	£ 1,628,683	£ 125,283
IT Transport Ltd (T)	12	£ 794,544	£ 66,212
University of Leeds (W)	11	£ 1,528,585	£ 138,962

In addition to the lead partners or ‘prime contractors’, a large number of partner organisations, most of which are based in developing countries, have been involved in EngKaR projects. Organisations from over 120 different countries have acted as formal partners to EngKaR projects. Exhibit 7 below lists the top ten countries in terms of the numbers of project participations undertaken by organisations based in that country, along with the total cost of those projects. It shows that India has been the country with the highest level of involvement overall, participating in almost a quarter of all of the projects. Sub-Saharan African countries figure strongly in the list, with Kenya, Zimbabwe, Uganda, South Africa, Ghana and Tanzania each participating in over 50 EngKaR projects. Towards the bottom of the list are other countries from the Asian subcontinent. Though not in the top ten, there has also been significant involvement by organisations based in middle-eastern, south-east Asian and south American countries.

Exhibit 7 Top ten countries, by number of participations as project partners

Country	Participations	Cost of projects
India	138	£ 29,471,405
Kenya	76	£ 15,881,611
Zimbabwe	73	£ 17,160,658
Uganda	72	£ 13,671,253
South Africa	65	£ 13,961,546
Ghana	57	£ 11,988,445
Tanzania	56	£ 11,096,828
Bangladesh	44	£ 7,782,558
Sri Lanka	44	£ 8,736,669
Nepal	43	£ 9,926,507

2.2 About the evaluation

2.2.1 Objectives and focus of the study

The Terms of Reference for the study, which are reproduced in full in Appendix A, required the evaluators to gather evidence and arrive at judgments regarding:

- The effectiveness of processes for identifying needs and opportunities
- The added value and benefits of DFID inputs into the programme
- The quality of the processes employed in running the programme
- The quality and relevance of research outputs produced within each sector of the programme
- The effectiveness of dissemination of programme outputs to identified stakeholders in both developing countries and the UK
- The value added in terms of poverty alleviation measures and other impacts on the poor
- The extent of uptake by decision makers and other end users in developing countries

DFID asked us to provide recommendations for:

- Possible strategies for future DFID funding in the areas of energy, water and sanitation, urban, geoscience and transport research themes
- Potential future areas of research not covered above
- Process improvements that may be considered by DFID
- Potential for strengthening dissemination and knowledge sharing activities
- Potential actions to optimise outcomes of existing projects
- Future evaluation activities

The focus of the evaluation study was effectively the whole of the EngKaR programme since it started at the beginning of the 1990s. However, in order to ensure that our findings were relevant to the current context, we were asked to focus most of our attention on activities undertaken from 2000 onwards within the programme's five main sectors (Water & Sanitation, Geosciences, Transport, Energy, Urbanisation).

2.2.2 Approach and methods

Our approach involved several inter-related steps, undertaken in parallel. Such a parallel approach is needed because individual methods are not always robust in isolation. Using multiple methods permits triangulation.

Desk review: The study team has reviewed a large amount of programme documentation including *inter alia* background studies, policy and other position papers, promotional literature, calls for proposals, procedures manuals, project reports and other associated outputs. The desk review has been used to orient the study team

and to gather information on the programme's context, objectives, structure, and operational activities.

Composition Analysis: The study team has analysed the available data concerning the programme and its projects, investigating the composition of the project portfolio, financial expenditure, research performers, and so on. This information provides both a useful perspective on how programme resources have actually been used, and enables the study team to determine where best to focus its subsequent investigations (e.g. which developing countries to visit in order to assess programme impacts).

Interviews with DFID staff: The study team has undertaken a number of interviews with policymakers and programme officials based in DFID's UK, India and Kenya offices. These interviews have been used to deepen our understanding of the history, context and performance of the programme, to determine DFID's own perceptions of programme strengths and weaknesses, and to identify any issues or problems that may have arisen over the years.

Questionnaire survey of project leaders: A questionnaire was developed and directed to the leaders of all EngKaR projects completed in the period 2000-2004. The questionnaire, which is reproduced in Appendix B, gathered factual information on various aspects of the projects (e.g. partnerships, number and types of outputs produced, impacts of the work) and sought the lead partners' views on various elements, such as the processes and procedures employed and the advice and support provided by DFID.

Independent project reviews: Independent experts from outside of the UK carried out project and portfolio reviews within each of the five main sectors of the programme. Each review entailed in-depth assessments of at least 5-6 individual projects and a wider assessment of the project portfolio as a whole. Each independent expert reviewed project and programme-level documentation, carried out a series of face-to-face interviews with the project managers of each of the projects under detailed review, and produced project-level reports as well as an overall statement concerning the sectoral portfolio as a whole. Short biographies of each of the independent experts employed on this study are shown in Appendix C.

In-country visits to India and Kenya: Visits were made to both India and Kenya to review the impacts of, and issues arising from, a selection of EngKaR projects undertaken within those countries. Detailed project documentation was reviewed, and interviews with in-country project partners and other stakeholders were conducted. The results were verified, amended and enriched through a multi-stakeholder workshop in each country to generate recommendations about how DFID's research could be better organised to meet the needs of these developing countries.

Communications Review: An overview of the communications element of the EngKaR programme was developed through discussions with the CIMRC Team and a review of the CIMRC web site. Project documentation from a selection of projects (focusing in particular on projects in Kenya and India) was reviewed to assess both communications activities during implementation and communications outputs, for different audiences – policy makers, researchers and end users. These findings were followed up during in-country interviews and workshops.

The findings arising from these various components have been synthesised into this final report. A limitation inherent in our choice of methods was that we could not collect systematic, questionnaire-based information from Southern beneficiaries and partners, owing to lack of centralised contact data and the practical problems of collecting such data across multiple cultures, languages and locations.

3 Evaluation Findings

This section sets out the findings of the evaluation. We consider how the programme has been planned, managed and implemented. We describe how it acquires projects and analyses their relevance to the programme. We describe the outputs of the projects, how they are disseminated and the role of DFID procedures in managing them before considering their impacts on knowledge production, the poor and on research capacity in beneficiary countries.

3.1 Programme Planning

3.1.1 General rationale and orientation of the programme

The importance of infrastructure service provision to both sustainable development and the eradication of poverty in developing countries is well documented⁷. Improved infrastructural services can bring immediate benefits in terms of helping poor people to meet their basic needs for safe drinking water, secure shelter, energy, transport, and so on. They can also facilitate sustainable economic growth in the longer term through, for example, the development of improved employment opportunities; reduced input and transaction costs associated with the production and sale of goods and services; and enhanced human capital and mobility.

While research confirms the importance of infrastructure service provision to sustainable development, investment in infrastructure has not always contributed to pro-poor growth. Inadequate attention to governance and institutional frameworks, high levels of personal and political corruption, and weak systems have resulted in a situation where the benefits have often been less than anticipated, and too often there have been negative rather than positive consequences for poor people. Influenced by negative experiences of this kind, DFID and other bilateral donors have turned away from major investment programmes through the public sector and reoriented the assistance that they provide to more direct poverty reduction measures.

Despite these negative experiences with infrastructure investment, it is hard to imagine how any country could escape from poverty whilst its people lack proper access to basic services such as water, energy and transport. Indeed, DFID's own Target Strategy Papers - developed recently in order to help frame DFID's work in support of the Millennium Development Goals - recognises the key role of infrastructure to livelihoods improvements, sustainable economic growth and poverty reduction. The challenge with respect to infrastructure is therefore to

- Develop an improved understanding of the technological, economic, social and institutional problems associated with the provision of infrastructure and the development of urban areas in developing countries, and

⁷ See the DFID publication "Making Connections – Infrastructure for Poverty Reduction" for a recent discussion of the role of infrastructure in poverty reduction

- Identify and foster those policies, technologies and skills that improve poor people’s access to infrastructure and help them to escape from poverty on a sustainable basis

The EngKaR programme has addressed these issues directly by supporting research in the key sectors associated with infrastructural development – water and sanitation, transport, energy, geosciences, urbanisation, disability and healthcare, and information and communication technologies.

Internationally, there are few dedicated research funding mechanisms globally that specifically address the challenges tackled by EngKaR, and those that do exist tend to be either small in scale or transitory in nature. Our investigations in India and Kenya confirmed that demand for engineering knowledge has been and remains strong and that most of the work supported through the programme would be difficult to finance from indigenous sources. The independent experts employed to review projects within each main Sector backed these sentiments

“DFID has become highly respected internationally for funding research addressing the issues connected to the increasing urbanisation of the developing world and helping to improve understanding of ways in which better management of the processes of urbanisation can help reduce poverty and achieve the Millennium Development Goals.”

Urbanisation Review

“There is an overall need to understand the current and future scenarios, options, and policies regarding energy supply and use, to ensure that energy constraints do not restrict economic growth and thereby nullify poverty reduction efforts”

Energy Review

We therefore strongly endorse the general rationale for an engineering knowledge and research programme aimed at improving poor people’s access to basic infrastructural services on a sustainable basis.

3.1.2 Identification of research needs within each sector

A major challenge for EngKaR is that there are so many problems and unknowns within the general ‘engineering / infrastructure’ area that it is not obvious how or where to focus. The problems themselves are moving targets. They are complex and often context specific, and in almost all cases require much more than research and new engineering knowledge in order to be resolved. The programme needs to focus on those issues and problems that are tractable by research and where knowledge new to its users is likely to be able to be produced and then widely applied. This section looks at the processes by which specific research needs and opportunities have been identified and described by the programme.

Programme-level planning was undertaken by a Steering Committee that was chaired by IUDD and comprised members drawn from the Commonwealth Secretariat, British Consultants Bureau, British Overseas NGOs for Development, European Commission, World Bank, DFID geographic Directorate and DFID non-engineering advisory group. The Committee was responsible for guiding the overall balance and

sectoral sub-themes of the KaR programme⁸, and had responsibility for overseeing the project appraisal and selection process and for deciding on the type of final outcome desired.

This Programme Steering Committee was in turn guided by Specialist Advisory Groups⁹, which were established within each sector in order to “identify the critical knowledge gaps and main areas of knowledge benefit” for the programme. Members were drawn from various international collaborations in which DFID was engaged, and DFID’s own sectoral specialists and external advisors provided supported to these Groups as necessary.

The outputs from the research planning process were presented in the annual calls for proposals and associated programme documentation. This ‘guidance to applicants’ tended to operate at two levels – generic guidance aimed at conveying a general shift in focus or prioritisation for the programme as a whole, and specific guidance concerning the priorities within each Thematic Area.

Generic Guidance

The generic guidance put forward each year tended to reflect current wisdom within DFID as to how best to ensure that the research kept pace with and reflected shifts in DFID policy. Below are typical examples of the kinds of positioning statements used:

1. KaR projects must be able to demonstrate a clear poverty focus in that the expected outcomes take account of the needs of poor and vulnerable groups
2. Demand assessment and participatory approaches are important to delivering appropriate research outputs and improving take-up
3. To improve the impact of the KaR programme dissemination, uptake pathways and application of EngKaR outputs are to be given greater emphasis and support

The generic guidance from DFID has increasingly tended to emphasise the importance of an ‘innovation’ approach rather than a more narrowly focused ‘research’ approach. This emphasis has arisen out of awareness that overcoming gaps in knowledge is not, in and of itself, sufficient to ensure a positive pro-poor outcome from the programme.

Overall, we consider that this generic guidance has been effective in helping to shift the focus of the programme over time away from primarily ‘engineering’ solutions developed at arms length from potential users, to a far more participatory, action-research and innovation centred approach. It has also been helpful in ensuring that projects cover more than one (and ideally all) of the key stages of the knowledge process – ranging from identification of needs, the research and development of one or more viable solutions, the production of outputs and transfer of results, commercialisation or policy implementation and uptake pathways. In particular, there is evidence to suggest that recent improvements in the range and quality of outputs and dissemination strategies have been achieved as a result of DFID’s continued emphasis on these factors over time.

⁸ See EngKaR strategy 2000-2005

⁹ One example is the Global Road Safety Partnership of which DFID is a member. The GRSP agreed to collaborate in identifying key knowledge gaps to be addressed through the programme.

Specific Guidance

The more specific guidance to applicants operated at the level of the Themes into which each Sector was subdivided. Each annual call for proposals carried a description of ‘key topics’ or ‘expected outputs’ for each Thematic area. Reproduced in Exhibit 8 below is an example of the type and quantity of information given to applicants in order to guide them on specific priorities.

Exhibit 8 Theme Information provided to applicants (example)

Transport Sector, Theme 2 - Reduce the costs of road transport by effective provision and management of infrastructure

This theme is primarily concerned with effective road transport operations and with the techniques of designing, constructing, maintaining, assessing, rehabilitating and reconstructing the roads and bridges under the wide range of conditions encountered in the developing world. It is also concerned with limiting the impacts to the natural environment which occur as a direct result of construction and maintenance operations.

The enormous cost of operating transport and of managing road networks highlights the justification for better quality key knowledge for:

- more effective use of local skills and resources for construction and maintenance;
- management of existing infrastructure in relation to identified priorities and available resources;
- the impact of road condition and deterioration on vehicle operating costs;
- the environmental impact of roads strategies.

This will contribute to pro-poor growth as well as to the international development targets for food security and sustainable development in particular.

Whilst the planning processes and resulting descriptions of priorities or expected outputs within each Thematic area have given some order to the programme’s activities, it is our contention that more could and should have been done to provide a clearer and more coherent ‘problem-oriented’ focus for the research. The Themes have not really gone far enough in terms of providing that focus or in helping to encourage and connect-up related projects that contribute to the same identified ‘knowledge gaps’ or ‘researchable problem areas’. Instead, they have operated merely as a guiding framework and administrative tool to help describe areas under which projects will be funded.

Within the same Theme we have found very different types of projects addressing very different issues, with little if anything to indicate that the research projects and researchers have been working towards a common research goal or the resolution of the same problem. This is exemplified by the fact that specific Themes have been opened or closed or merged over time, with projects being reassigned to alternative Themes without interruption or real consequence for the research process. In reviewing the portfolios of projects supported within each Sector, our experts argued that many projects could have been allocated to alternative Themes, and we saw and heard little to suggest that projects were expected to feed into or off each other.

“The problem that the themes were not sufficiently distinguishable appears to be acknowledged by the discontinuation of themes 1 and 5 and their being folded into

the others. Even after removing the two themes, the remaining four do not appear to have been helpful to the research programming. For instance, the placement of R8021 (Smoke, health and household energy) into Theme E4 while the project R8345 (Researching pathways to scaling up sustainable and effective kitchen smoke alleviation) which was a continuation of the first and with a larger scale was considered to be theme E6”

Energy Review

There is a clear need to *cluster* projects so that they are mutually supporting and together achieve greater critical mass –in terms of the research, the capacity they build and in terms of the visibility they need in order to have an impact on policy and practice. Failure to cluster activities is, in fact, a generic weakness of bottom-up R&D support schemes, and it is noteworthy that – following a series of negative observations in evaluations of parts of the Framework Programme – the European Commission has adopted a principle of clustering projects.¹⁰

The lack of clear direction provided by the planning processes is further exemplified by the fact that the programme has acquired almost all of its projects through open calls that encourage members of the research community to come forward with their own ideas as to what research should be conducted. Had the various programme planning efforts actually identified specific knowledge gaps that prevent or hamper the resolution of specific problems, we would have expected to see a much higher proportion of directly commissioned work and studies let through restricted invitations to tender and, as a result, much clearer clusters of projects tackling related topics. In fact, most project ideas have been generated bottom-up by the researchers themselves, suggesting that the programme has operated more as an open fund than as a strategic programme being deployed to resolve specific knowledge gaps.

DFID has, in recent years, taken steps to improve the extent to which it ‘directed’ the programme, via the identification of specific knowledge gaps and the commissioning of studies to address them. Indeed, the EngKaR strategy for the period 2000-2005 made reference to the introduction of two new mechanisms in addition to the standard process of inviting proposals against the programme’s existing sectoral and thematic framework:

- ***Directed activity:*** *An increasing proportion of the programme is being directed to address key aspects within the Themes, as the relevant Specialist Advisory Groups assist with identifying specific priority knowledge gaps. This enables us to define key research requirements for competitive proposals. It is proposed that such directed activity will account for at least one third of the KaR budget by 2004*
- ***Responsive fund:*** *There is a role for some smaller scale funding to be used flexibly to address new or cross-cutting ideas (including dissemination or scoping activities). Up to 5% of the KaR budget is allocated for this purpose*

In addition, the strategy made reference to (i) a tightening of the focus of the Themes in response to emerging DFID strategy papers, and (ii) efforts to encourage some longer projects in order to address strategic or institutional issues. Whilst there is some evidence of movement in these directions, it does not appear that the new

¹⁰ Erik Arnold, *What the Evaluation Record tells us about Framework Programme Performance*, Brussels: CEC DG-Research, 2005

mechanisms were fully introduced or given the prominence they deserved within the overall make-up of the programme. As we go on to argue later in this report, an absence of clear focus and intent on the part of DFID at the planning stage has had a detrimental impact on what the programme has been able to achieve in terms of exploitation and impacts.

3.2 Programme Implementation

3.2.1 Project acquisition

Within the general framework provided by the Sectors and the more-specific areas described within each of the Themes, annual calls were used to solicit project proposals from within the UK research community. This ‘competition for ideas’ was operated on a largely open basis, with any UK research performer (and latterly any research performer anywhere) eligible to bid for and be awarded a research contract under the programme. This process has resulted in a wide range of different types of work, ranging from fairly ‘hard’ engineering research aimed at, for example, the provision of improved technical guidance on road surfacings through to social scientific studies aimed at, for example, the development of improved techniques for determining the needs and aspirations of poor people,

The programme has followed established good practice in the operation of the application and appraisal processes. Calls have been issued in line with published timetables, clear guidance has been provided to applicants, and proposals have been submitted, assessed and selected via a reasonably transparent process involving DFID staff and independent experts. Most (55%) of the project leaders who responded to our questionnaire survey rated the EngKaR application process as good or very good, with a further quarter (26%) assigning a neutral rating.

Whilst the project acquisition processes and procedures employed were generally well conceived and implemented, we did identify some specific problems

- Application forms were unwieldy and convoluted, despite (or possibly because of) frequent attempts to improve them. It was often difficult for the study team to understand from project proposals exactly what research was to be conducted and to what end. Applicants and assessors also indicated that they have struggled with the application forms, with many describing them as unduly lengthy and elaborate whilst also being highly restrictive in terms of the sorts of information requested and space provided
- The openness of the research areas (Themes) has naturally led to uncertainty among applicants as to whether their idea(s) would be supported, prompting many to adopt something of a scattergun approach to the bidding process. This meant that large numbers of proposals were typically received in each area, which in turn led to fairly high failure rates. Over time, this appears to have exerted a negative effect on the amount of time applicants have been prepared to devote to each proposal, resulting in offers that were, on the whole, less well articulated than one might have hoped
- At times it seems that were too many policy imperatives being assigned to the programme, with the result that applicants seemed to drown somewhat under the

weight of all the issues and ideas they had to deal with and connect their projects to. Given the limitations of the total research budget and the amount of money that DFID was prepared to allocate to each individual project, expanded scope, in many instances, led to inadequate inputs along too many dimensions

DFID made various attempts to improve and refine the application and appraisal processes in light of independent assessments and feedback received from those involved. In particular, a two-stage process was introduced where short ‘concept notes’ were submitted and appraised in the first instance, with full proposals only being invited in a limited number of cases where the concept was adjudged to have been among the strongest of those put forward. The advantages of the two-stage process are that

- The unit cost associated with putting forward an idea is significantly reduced, which minimises the wasted effort on the part of unsuccessful applicants
- The programme tends to attract a larger number of ideas, increasing the range of choice available to the programme and its assessors
- The amount of time given over to the preparation of full proposals can increase, as second-stage applicants have already received an indication that their idea has potential and there is a reasonably high probability of success if their bid is well developed

The introduction of the two-stage process has certainly helped to control abortive bidding costs and was well received by the participants we spoke to. However, with a tighter focus for the research, such large numbers of proposals are unlikely to have been submitted.

3.2.2 Relevance of the activities funded

Results from our questionnaire survey of project leaders confirmed that the researchers themselves generated most project ‘ideas’, rather than being prompted by DFID or stakeholders within developing countries. Few projects included formal needs or context assessments, but almost all project ideas were tested and refined in collaboration with in-country partners and target audiences. Much of the work has emerged from previous studies with well-established partners who are already working in the field and are well aware of the needs and context. Some of the southern organisations were involved as *formal* partners, whilst other projects consulted southern organisations on a more informal basis as part of the project formulation process.

The competitive bidding process, where relevance to and involvement of users was a key test, coupled to the rather open framework within which the programme operated, virtually guaranteed that the funded projects would be relevant in some way. Almost all the projects reviewed by our independent experts were found to be of relevance to their intended target audiences and the needs of poor people. Based on short descriptions of all the funded projects in their Sector, experts confirmed that very few if any of the projects suffered from being totally disconnected to real problems and real people who could benefit from the research. Our work in India and Kenya revealed that some EngKaR projects, as originally conceived, were of limited

relevance to the local context, and that partners in-country had to negotiate changes in order to improve the applicability of the results.

However, while all projects have made efforts to engage local stakeholders and communities, there is a limit to the geographical coverage that can be provided through these largely disconnected, relatively small-scale actions. While some projects have been able to undertake activities and engage stakeholders across many developing countries, most have had to limit their scope to two or three. The degree of engagement is usually different at different levels (community – local – national) and at different stages in the project. The nature of the engagement also varies considerably - some projects aim simply to ‘inform’, others ‘liaise with’, but only a minority really ‘involve’ key Southern stakeholders in all aspects of the work.

Despite generally good levels of engagement and relevance at the individual project level, the programme has not been able to demonstrate much coherence as to what it is all about at any other level. Interviews with project leaders confirmed that there are relatively few connections between individual projects, even within the same Themes, and each of our independent experts argued that the portfolios of work they had reviewed appeared disjointed and fragmented. It is our view that the vagaries of a bottom up competitive bidding process have resulted in a rather mixed collection of projects, each of which is of relevance to the programme and its general pro-poor stance, but which collectively do not add up to a particularly coherent body of work. In some cases a continuum of projects has pushed deeper and further into certain issues or problems, whilst in others just a single project has been supported, with no subsequent follow-on work apparent within the portfolio. In other areas where we might have expected to find some work, none has been present. There is a little information or evidence to explain why DFID has elected to fund many projects over many years on certain topics whilst other areas have attracted no funding or have had just one project supported.

The rationale for the programme and its intervention logic is also unclear to stakeholders in developing countries, and many of those we interviewed are confused as to whom the research is really for (DFID, Governments, the communities, the global knowledge base?). This is linked to the related issue of ‘whose agenda matters?’ Stakeholders in DCs are unsure as to whether the research is expected to address their needs or not, and how they could go about influencing the programme’s agenda. This confusion is compounded by large differences in the numbers of projects supported by EngKaR within each Sector that actually ‘operate’ (i.e. have some of their activity situated) in any given country. For many, the portfolio is highly fragmented both *geographically* and *by issue* – i.e. a large number of small stand-alone projects, most of which are tackling very different issues within any given sector, and which tend to be ‘present’ only within a limited geographical area within a small number of (usually two or three) countries.

Exhibit 9 helps to illustrate this point by listing the top ten countries in terms of the number of EngKaR projects with partners based there, for each of the five main sectors. The number of projects with partners from each country is shown in brackets. When we consider that these data relate to a 15-year period, simple arithmetic shows that it is unlikely that more than two or three projects within the same sector will be in operation in any given country at any given time. Given that

each Sector covers several fairly broad Themes, it is easy to see how the research in any given area as viewed from the perspective of any given country will appear fragmented and sub-critical in terms of the scale and continuity of effort.

Exhibit 9 Countries with most EngKaR projects, by sector

Energy	Geoscience	Transport	Urban	Water & Sanitation
India (25)	Zimbabwe (7)	Zimbabwe (24)	India (39)	India (40)
Kenya (18)	Zambia (5)	Tanzania (21)	Kenya (19)	Uganda (18)
S Africa (15)	China (4)	Ghana (21)	S Africa (18)	S Africa (17)
Uganda (14)	Tanzania (4)	India (19)	Sri Lanka (14)	Zambia (16)
Zimbabwe (12)	Costa Rica (4)	Uganda (15)	Uganda (11)	Zimbabwe (16)
Nepal (12)	India (3)	Malawi (11)	Zambia (11)	Tanzania (16)
Ghana (11)	Kenya (3)	Indonesia (11)	Zimbabwe (9)	Kenya (15)
Ethiopia (10)	Nepal (3)	Kenya (10)	Pakistan (9)	Bangladesh (15)
Sri Lanka (9)	Sri Lanka (3)	Bangladesh (10)	Bangladesh (8)	Ghana (15)
China (9)	Thailand (3)	Nepal (10)	Brazil (8)	Nepal (13)

Some of the people we interviewed went further, arguing that the project portfolio reflects UK-based research strengths and does little to address the research priorities (policy and practice) of DCs. This is somewhat inevitable in a programme where the funding is required to address global needs rather than the needs of any single country and research ideas are generated bottom-up by UK-based researchers. This is an area of major challenge for a programme such as EngKaR – how can it produce results that are both relevant and widely applicable when the developing countries that might benefit from those results are so diverse in terms of their levels of development and the range of cultures, political systems and socio-economic contexts in play? We return to this question later when considering how to best orient future infrastructure research to the needs of developing countries.

3.2.3 Managing research progress

Based on the information available to us, it appears that the projects have been well implemented on the whole. Our questionnaire survey of project leaders suggested that only a minority of projects experienced problems with progress, and where this did happen the problems were resolved without undue impact on the outcome of the projects.

When asked to indicate whether various (given) factors had exerted a positive or negative influence on the progress of their project, project leaders indicated that only a minority (less than a quarter) of the projects had experienced problems, and very few had experienced *serious* difficulties or delays to progress as a result. The factors that were rated as having exerted the most positive influence on project progress were competence levels within the project teams (85%); levels of interest within user communities (83%); and levels of interest within southern partner organisations (84%). Most project leaders also rated the availability of qualified personnel in the South as having had a positive impact on progress, though one in seven projects (16%) experienced difficulties finding suitable personnel.

Factors that have caused problems for a significant minority of the projects were lack of access to finance for communication activities (21%); low interest levels within DFID country offices in the South (18%); and lack of access to DFID country offices in the South (15%). A third of project leaders experienced problems with at least one of these aspects.

Project leaders who indicated that their objectives had only been partly achieved cited the following problems:

- Lower than expected input from partners/users in the South. In most cases the problems related to a lack of information/data contributed to the project or lack of engagement with the results. This was the most common set of reasons underlying a failure fully to realise project goals
- Changing political landscape or civil unrest in areas where the results should have been applied
- Over-ambitious projects which struggled, for technical reasons, to produce the quality or quantity of results envisaged at the outset
- Lack of support or responsiveness from DFID, particularly the Country Offices which are in most cases approached but rarely have the capacity (in terms of time or capability) to engage with the projects

The independent experts who reviewed a sample of projects within each Sector concluded that the projects had been professionally managed and well conducted on the whole, as evidenced by the generally good quality of the research outputs.

“The review of the seven research projects clearly shows that they were well performed and managed”

Transport Review

Where problems with progress were identified, these tended to be as a result of unforeseeable problems outside the project leader’s control. In a small number of cases, failure fully to attain project goals stemmed from overambitious objectives given the available resources and the methods employed, rather than from poor performance on the part of the consortia.

“The in-depth reviews of the project sample suggests that most of the individual studies were conducted reasonably well within the constraints of the programme design and management processes used. Beyond the constraints noted above, we found that the requirement that the project be carried out in more than one country, the addition of increased components of knowledge within one research study and the high costs of UK researchers, bounded by the average size of the grants led to fragmented inputs.”

Energy Review

Our investigations in Kenya and India confirmed that it is not uncommon for projects to run more slowly & achieve less than was hoped. This is seen as partly a problem of ‘over-selling’ at the bidding stage, with projects setting out unrealistic objectives and timeframes in order to help to secure an award, and partly due to unforeseeable constraints in developing country contexts. The fact that the projects are UK-led and aimed at producing ‘generically applicable findings’ will naturally limit the extent of commitment from any single set of actors in any single country. It seems particularly

difficult to work with the commercial sector – there are tensions around values, project objectives and timeframes that need to be thought through better at the outset and more carefully managed throughout if strong private sector engagement is required.

Discussions with project leaders in the UK revealed that, on the whole, DFID's sectoral advisors had exhibited a high degree of flexibility with respect to the conduct of projects, permitting changes to the scope, focus or outputs of specific projects where changing circumstances made such adjustments prudent. The extent to which we received positive or negative feedback in this regard varied depending on the DFID official concerned. However, in most cases DFID officials were complimented on their engagement with the research and the open, supportive and flexible stance they took towards the research and the contractors. This was particularly so for the more senior sector advisors who remained in post for several years and were thus able to build relationships with the research base and provide better continuity and coherence to the portfolio in their area.

When interviewed, many researchers mentioned that DFID (UK) had encouraged all of the projects to seek support from DFID's country offices in those locations where the projects were actually carrying out part of their work. However, whilst all of the researchers claimed to have tried to engage with DFID's in-country offices and programmes, few reported many positive experiences in this regard. The general view was that in most cases these offices simply do not have the time or capacity to engage with (large numbers of) EngKaR projects and that most of the work does not have the critical mass or policy profile necessary to provoke active support and buy-in by DFID in-country.

3.2.4 Production of project outputs

3.2.4.1 Project-level outputs

Our questionnaire survey asked the leaders of completed projects to indicate the number and types of outputs planned and actually produced directly through their projects. Exhibit 10 shows the proportion of completed projects that planned to, and actually produced, each of various different types of output. It shows that EngKaR projects have produced a wide variety of different types of output, and that at an aggregate level realisation rates have been high. Written reports have been the most common category of output, planned in 81% of cases and actually produced by 88% of the projects. The next more common category of outputs - handbooks – were a planned output for just over a third (37%) of the projects, and were actually produced by 33%. Training courses were the third most common type of planned output (expected in 25% of projects) and were produced by 31% of projects.

Exhibit 10 Proportion of completed EngKaR projects expecting and actually producing different categories of output (n=52)

	Share of projects expecting this type of output	Share of projects producing this type of output
Written reports or other publications	81%	88%
Handbooks	37%	33%
Training courses for delivery in poor countries	25%	31%
Research tools or instruments	19%	21%
New products developed for use in poor countries	13%	15%
Prototypes	12%	13%
Tech./knowledge transfers to existing companies	10%	10%
New policy guidelines or draft legislation	10%	19%
Existing processes modified for use in poor countries	8%	12%
Existing products modified for use in poor countries	6%	10%
New processes developed for use in poor countries	6%	13%
Tech./knowledge transfers via new/spin-off companies	4%	2%

By comparison, only a relatively small proportion of the projects either planned to or actually produced the other types of outputs listed in Exhibit 10. Few of the projects funded in recent years have actually undertaken product or process development or have sought to transfer technologies to users in developing countries. Whilst the programme carries an ‘engineering’ label and funds some work aimed at developing intermediate technologies, most of the recent focus has been on improving understanding of various infrastructure-related issues in developing countries, particularly around how best to implement and maintain it so that poor communities gain access to it and benefit from it.

Exhibit 11 shows the numbers of each type of output that were (a) planned and (b) actually produced across the 52 completed projects for which questionnaire data are available. From it we can see that written reports and handbooks were by the far the most numerous types of *planned* outputs, with almost 500 reports and 200 handbooks expected..

Exhibit 11 Numbers of outputs planned and delivered by completed EngKaR projects (n=52)

	Number of outputs planned	Number of outputs produced	Surplus/ shortfall
Written reports or other publications	489	549	+60
Handbooks	173	170	-3
Prototypes*	48	51	+3
New products developed for use in poor countries*	20	21	+1
Training courses for delivery in poor countries	43	57	+14
Research tools or instruments	17	20	+3
Tech./knowledge transfers to existing companies	12	14	+2
Existing processes modified for use in poor countries	10	12	+2
New policy guidelines or draft legislation	5	11	+6
New processes developed for use in poor countries	5	15	+10
Tech./knowledge transfers via new/spin-off companies	4	3	-1
Existing products modified for use in poor countries	4	11	+7

* n = 51

Exhibit 10 and Exhibit 11 demonstrate that, on the whole, completed EngKaR projects have ‘delivered’ in terms of the types and numbers of outputs expected to be produced. Further analysis confirmed this by showing that half of the completed projects (50%) have produced the same number of outputs as planned, 46% have produced *more* outputs than planned and just 4% produced fewer outputs than planned.

Given the importance of written reports as one of, if not *the*, most important categories of output generated by the projects, we asked respondents to notify us of the number of copies of their reports that they expect to produce and distribute, and the number of languages in which they will be made available. The results showed that the average number of copies of reports produced per project is around 350, though over a quarter of the projects have produced in excess of 500 copies. Just 5% of the projects were only expecting to produce their written reports in single figures. These results suggest that EngKaR project results are exposed to a fairly large readership.

The results in terms of the number of languages in which the written reports will be produced were rather less impressive – the vast majority of projects (80%) are only producing reports in English, and most of the remainder will translate their reports into just one or two additional languages. Only two projects in our sample were disseminating their results in more than three languages.

For ongoing projects it was not possible to determine whether the outputs produced matched those planned at the outset. However, we were able to discern that ongoing (i.e. more recently commissioned) projects were more likely to be producing a wide range of different outputs, especially policy guidelines and new processes. The results also demonstrated that many projects are generating outputs of various different types during their implementation (as opposed to all at the end).

The detailed project reviews confirmed that EngKaR projects, especially the more recent ones, have indeed produced a wide array of outputs, designed for and tailored towards different target audiences. During the course of the study we saw the following types of outputs

- Written reports describing the research work and findings
- Guidelines and handbooks containing specific ‘how to’ advice
- Technical notes and design guides
- Peer-reviewed journal articles
- Videos and CD-ROMs
- Software tools and models
- Conference papers and workshop proceedings
- Training courses and toolkits
- Television and radio programme content
- Websites

The independent experts were, on the whole, impressed by the range and quality of outputs produced, with only a small minority of projects underperforming in this regard. It would appear that recent efforts on the part of DFID to improve the range and quality of outputs produced, as part of a wider effort to improve the take-up and impacts of the results of its research investments, have begun to pay off.

A small number of problems with the reviewed outputs were identified. The main problem we encountered was a lack of clarity in some circumstances as to who the user of the output would be, with some outputs being written for too wide an audience and therefore being rather too general in nature to be useful. Whilst many of the outputs produced by the projects may be of potential *interest* to many different parties, the aim of the programme has been to get the research results adopted and applied to the benefit of poor communities. In order for this to happen the programme needs to produce advice and guidance that directly addresses defined target audiences – users who have both the incentive and the means to adopt and apply that new knowledge. We are naturally suspicious where an output has been written for national governments *and* NGOs *and* community leaders *and* engineers.

In some cases, the research projects had not been written-up as fully as they could have been, with some projects producing outputs that were a little too synthetic. This has meant that it is more difficult than it should be for others to investigate, appraise or validate the work that has been conducted. Whilst different types of output need to be packaged differently for different audiences, we would expect *all* of the projects to produce a report, suitable for other researchers, which fully explains the background to the project, the methods employed, results obtained, and so on.

This brings us on to the related issue of ‘quality assurance’ of project outputs. Whilst the outputs we have seen during the course of the study have been of a good general standard, one or two reports were considered by our experts to be of a rather low quality. Whilst not a major issue in and of itself, this does raise concerns about the extent to which programme managers have really engaged with the outputs and tested them for their relevance, quality and utility prior to their being disseminated. It

appears that outputs have been checked against what was promised in the contract, rather than being tested for applicability, legibility, reliability, usability and so on.

“The outputs are fortunately of a higher quality than the poor management of the process should have delivered. This speaks well of the quality and responsibility of most of the researchers and institutions engaged in this programme”

Energy review

This lack of real performance monitoring has meant that the programme has failed to provide any kind of feedback back into the buying process. The people involved in appraising research proposals have no information on the recent performance of applicants and little option but to accept at face value what is being promised. Ideally those involved in assessing proposals would be armed with up to date information on the *impacts* of recently completed projects, including assessments of why certain projects have succeeded or failed. This rarely happens in practice, partly because of the time and costs involved but mainly because research programmes tend to be organised as funding mechanisms rather than as mechanisms for achieving specific outcomes. However, it is not difficult to implement a more limited process that independently assesses the quality and relevance of outputs produced by individual projects. Such information would not only aid the buying process by helping assessors better to understand contractor performance, it would also act as an incentive to researchers by rewarding good performance.

3.2.4.2 Synthesis of Results

Whilst the independent experts were generally impressed by the range and quality of outputs emerging from individual projects, they were rather disappointed with the extent to which DFID had managed to synthesise results across projects, and thereby ‘sum up’ what is known, and what remains to be known in connection with a priority issue being addressed by the programme. There is little sense that projects within the portfolio are related to one another (other than sometimes following on one from the next) or are jointly contributing to the resolution of a common problem or issue. As such, there is little to suggest that the programme is much more than the sum of its individual parts (i.e. a collection of largely unrelated projects).

A major weakness of the program is the absence of any systematic means for synthesis of what has been learned through the research funded by the KAR program as well as other similar programs funded by other agencies, and a lack of identification and prioritisation of specific knowledge gaps. This led to a portfolio where the links between what is studied in one project and what is known already, including from other projects in the portfolio, were often missing. Many individual projects, researchers, and institutions, and the program itself, appear to be working within their own silos with no systematic linkage of the research to create a “knowledge pool”.

Energy Review

In large part this problem stems from weaknesses in the planning process already alluded to above. In most cases it is unlikely that individual projects of the size and type funded within this programme will, on their own, be able to deliver major findings that have a substantive impact in the real world. We believe the programme will achieve more impacts if groups of related projects can, in concert, address specific knowledge gaps that have already been shown to be hindering or limiting actual development or poverty alleviation measures, and if the results of these efforts

are synthesised in order to demonstrate what has been learned. We discuss this matter further in the section dealing with programme impacts.

3.2.5 Dissemination of outputs and promotion of results

3.2.5.1 Project-level

All of the projects reviewed during this study made some effort to disseminate their results. As we would expect, the nature and amount of dissemination activities varied widely from one project to the next. Some of the older projects have done little more than produce a final report but most produce a range of communication outputs for various audiences. DFID has taken steps over the past few years to encourage improved dissemination of outputs from its research investments, and there was evidence to suggest that these efforts have been successful. Most of the more recently completed projects in the portfolio have planned for, and undertaken, a broad range of different dissemination efforts within the confines of the project itself. While some emphasise the importance of face-to-face dialogue through field visits, workshops and seminars others emphasise printed media and some use sophisticated approaches involving the media and/or ICT.

Project-level dissemination activities typically include one or (usually) several of the following actions:

- Printing and distributing freely large numbers of copies of written outputs, most of which are targeted towards specific audiences and for specific purposes
- Publication of research results through peer reviewed journal articles
- Posting written outputs and software tools on project and/or programme websites
- Hosting regional or national workshops both in the UK and developing countries, in order to discuss the results and promote the suggested actions
- Promoting the results through established fora such as research networks, international focus groups, scientific conferences, and so on. In some cases the programme has even supported the establishment of fora to aid the process of research prioritisation and the dissemination and communication of results
- Promoting the results through TV and radio broadcasts, notably the BBC World Service's Earth Report series

On the whole our independent experts were impressed by range of dissemination and promotional mechanisms employed, particularly on more recent projects:

“The dissemination and exploitation mechanisms were with one exception well planned and executed and in some cases very well planned. Dissemination may have improved over time - the earliest of the projects reviewed was the weakest in this respect while some projects completed in 2004 had very good mechanisms for dissemination.”

Transport Review

The emphasis on communication is very strong and commendable, with attention and adequate funding going to promote dissemination. This is particularly important and provides the main potential development gain

Urbanisation Review

There were, however, some weaknesses identified with respect to project-level dissemination. In many cases it was rather difficult to identify quite what outputs have been produced by a given project, and whether and where it is possible to access these. We were often unable to find the full range of project outputs available on-line, and in some cases struggled to locate any material at all without contacting the researchers directly. DFID has taken steps to improve the extent to which outputs from EngKaR projects are made available on-line, with the ultimate objective of ensuring that all outputs can be accessed through the programme's websites. However, there is still some way to go before this ambition is fully realised, with so far only the Transport Sector work being successful in this respect

In some cases the projects appeared unable to identify potential users beyond those who had been directly involved in the research projects. While the participatory approaches employed within EngKaR projects ensure that researchers work directly with intermediaries and end users in the (typically) two or three countries where the research is carried out, the project teams have often had little reach into other developing countries that could benefit from the results.

This view was confirmed by interviewees in India and Kenya, where the general consensus was that the results of projects are more or less invisible outside the group of immediate stakeholders, and much more could be done to promote results to a wider audience. All felt that DFID's country offices could play an important role in this respect. Interviewees also stressed that for many stakeholders in developing countries "seeing is believing." Face-to-face dialogue through field visits, workshops and seminars is seen as crucial, with word of mouth often having a greater impact than printed communications. There are sometimes concerns that reports which come from UK researchers or DFID head office may not be compatible with local situations, and all felt that localised dissemination was much more effective in terms of reaching policymakers and changing policy than widespread dissemination of more generalised outputs.

It appears, therefore, that there have been substantial improvements to project-level communications in recent years but that more needs to be done to ensure and then demonstrate to large numbers of stakeholders that the results are relevant, valid and appropriate to their needs. This does present a significant challenge for individual projects, which do not have sufficient resources to communicate their results to all the stakeholders in all the countries that might benefit from them. Further, demonstrating how results can be applied in many different countries and adjusting them to fit the local context are both non-trivial tasks that also lie beyond the scope of most projects. It is for these reasons that we would challenge the programme's basic strategy of spreading its resources across large numbers of small, geographically and thematically disparate projects.

3.2.5.2 Portfolio- and programme-level

In addition to the project-level dissemination techniques identified above, DFID has supported a number of dedicated activities aimed at improving programme communications and the packaging and dissemination of results. Significant among these are the development of Sectoral Communication Strategies - developed and implemented by the Resource Centres - and the establishment of a dedicated 'Communication and Information Management Resource Centre' (CIMRC).

Resource Centres

DFID has supported engineering ‘Resource Centres’ within each of the five main Sectors covered by the programme. The KaR Resource Centres were set up by DFID to provide technical advice and support and to carry out a series of dedicated functions on behalf of the programme. Central among these are the coordination and dissemination of the research within their Sector. This takes place primarily through the establishment and maintenance of a dedicated website, the production and distribution of biannual newsletters, and undertaking other ad-hoc activities as agreed with DFID.

The Resource Centres are

- Geoscience - British Geological Survey
- Water - HR Wallingford
- Transport - Transport Research Laboratory
- Energy - AEA Technology (FES)
- Urbanisation - Loughborough University (WEDC)

Since the Resource Centres are themselves major beneficiaries of the programme, there is a clear risk that they can be put in situations of conflict of interest. To avoid this risk, Resource Centres should ideally not be otherwise involved in the programme. In practice, however, their reputation and deep engagement in their fields makes them the most natural contact points for those wanting to use EngKaR research results, and the primary role of the Resource Centres is dissemination. They do not play an institutional role in either proposal assessment or in managing contracts with their own organisation. We are satisfied that, on the balance of advantage, they are properly located.

Most of the Sectoral websites developed and maintained by the Resource Centres provide similar types and amounts of information on the programme

- Basic descriptions of the Programme, the Sector and the Themes
- Summary information on each of the projects funded under the EngKaR programme within that Sector
- Downloadable copies of each six-monthly Newsletter produced by each RC as part of their dissemination activities
- A ‘links’ page connecting the user to other RC websites, dedicated project websites (where they exist) and other relevant resources

It is fair to say that some of the Resource Centre websites are more fully developed than others. In our view the Transport website maintained by TRL is among the best in terms of the quantity and quality of information available through the site. All could be improved in terms of their general layout and functionality. There is also a general need to ensure that the outputs from all funded projects are made available on-line, as indicated above. More efforts should be made to signpost these outputs, where they exist, and to ensure that downloadable files are not unduly large. Several of the reports we attempted to access were in excess of 5Mb, mainly as a result of the inclusion of a large number of high-resolution images. Greater efforts need to be

made to ensure that file sizes are more appropriate, especially given that many potential users are likely to have limited bandwidth Internet connections.

The Newsletters produced biannually by each Resource Centre follow a reasonably similar format, featuring short ‘articles’ on ongoing and recently completed projects and providing contact details of the researchers so that the reader can follow-up and gain further information if required. As such, they appear to be a useful tool for keeping interested parties informed about some of the projects in the portfolio but do not to our mind serve any other useful function. While large numbers of these newsletters are produced and distributed, it is not clear who their intended or actual readership is and we are not aware of any work that has determined how useful readers find them or indeed whether they are actually read at all.

Our questionnaire survey showed that only around half (51%) of the programme’s participants¹¹ understand the role of the EngKaR Resource Centres. Of these, around three-quarters (74%) consider that the need for such centres is high, with the remainder stating that there is a medium-level need. In terms of the actual utility of the centres, only a quarter (27%) stated that they found them to be of high utility, with most of the remainder providing a ‘medium’ rating. Just 4% of respondents found the Resource Centres to be of low utility in practice. However, these ratings perhaps reflect the fact that the Resource Centres support DFID and the programme rather than the projects or the research teams.

There is not a great deal of ‘hard data’ available on dissemination activities at the Sector level, though TRL, which is among the more advanced organisations in terms of its dissemination and communication activities did supply the study team with some data relating to ‘hits’ on its Transport Links (EngKaR) website and hard-copy distribution of its key publications. This information is summarised below.

¹¹ Responses obtained from organisations that are themselves Resource Centres have not been included here.

Transport Dissemination

Website

There are roughly 10,000 ‘hits’ per month on Transport Links, a considerable increase on the 600 a month estimate when the site was launched in 2001. Several hundred organisations access the site more than five times a month. Most visitors to the site are from Europe and North America, suggesting that other researchers are the primary users of the site. However, the share of users from South America, Africa and Asia is steadily increasing, with users from DCs now representing around a third of all visitors to the site.

Hard copy reports

As regards dissemination of reports in hard copy, only TRL’s own publications are currently dispatched. These are free of charge to 'bona fide' enquirers from developing countries, while others are charged for materials provided. The numbers of distributed copies of Overseas Road Notes (ORNs) and other reports and papers averaged around 5,000 per annum in the period 1999-2002. From 2002 the number of printed papers distributed fell as this material became available from websites and on CD-ROMs. Typically, just over half of the 5,000+ hard copy reports distributed in a given year are sent to recipients in African countries, around a fifth go to recipients in Asia, and the remainder to other world regions. Recipients are predominantly governments, consultants, aid agencies and researchers.

The information provided to the study team confirmed that Resource Centres are improving the extent to which they are tracking and assessing their dissemination activities. They are also actively gathering feedback on and making improvements to their communication activities. Attempts by DFID over the past few years to strengthen the programme’s dissemination and communication activities are again in evidence and are beginning to pay dividends.

CIMRC and Infrastructures Connect

In 2001 DFID established a ‘Communications and Information Management Resource Centre’ (CIMRC) to provide communication services for IUDD and EngKaR. A four-partner consortium led by CAB International was awarded the contract to run the CIMRC over a three-year period. The Resource Centre contract revolved around the development and implementation of a communications strategy for the EngKaR programme, but also involved more general information management services, dissemination, advice and support, etc. on behalf of IUDD and the EngKaR programme. The main activities undertaken to date, in addition to the development of the communications strategy itself, have been, to:

- Make improvements to DFID’s own internal management information systems and data archive in order to overcome deficiencies
- Develop improved project databases and prepare a central repository of electronic project outputs
- Develop a Resource Centre website (www.cimrc.info) and a central programme website (www.infrastructureconnect.info)
- Preparation of a series of ‘success stories’ emanating from the programme
- Develop a series of guides on effective dissemination and communication to assist EngKaR researchers. These included “Guidelines for effective dissemination”,

“How to spot a success story”, “How to make information user driven”, and “Advocacy impact assessment guidelines”

Based on the material available, we would endorse the general need for an improved, better-coordinated approach to information management and communication, and believe that the strategy developed by CIMRC sets out sensible and necessary actions for improving the situation. However, the activities proposed by CIMRC and (moreover) those actually commissioned by DFID have, in our view, lean too heavily towards improving information management and communications *within* IUDD and EngKaR at the expense of activities that would improve communication between the programme and its intended beneficiaries in developing countries. The guides on dissemination and communication, while of a good quality and utility, do not really help to overcome the key barriers identified by CIMRC in the course of developing its strategy¹², namely that:

- Stakeholders are largely unaware of the information that is being disseminated
- Potential users often do not have the resource, knowledge or incentives to use the information
- There is insufficient attention paid to the tailoring of outputs to the real needs of real users
- There is rather too much information ‘out there’ leaving potential users unsure of what they should and should not be paying attention to

These barriers are not easy to overcome, but their resolution certainly requires more than improved information management and dissemination organised at the UK end of things. The general focus of these ‘additional’ communication efforts on those elements that can be readily addressed in the UK without the expense of having to conduct a lot of activity overseas appears to be in line with DFID’s preference for the contract as opposed to CIMRC’s. Whilst we believe that CIMRC’s work is adding value to the programme, it would be a mistake to assume that these activities are sufficient radical significantly to improve the take-up and impact of research results.

We would contend that by electing to expend the vast majority of the programme’s available budget on a large number of relatively small, unconnected projects across a very broad range of subjects, DFID has made dissemination and communication much more of a challenge than it might otherwise have been. It is very difficult to ‘add up’ and synthesise what has been learned through the projects because of their number and heterogeneity. As a result, retrospective efforts to improve the dissemination and take-up of the research investments, though valuable, are unlikely to overcome the key barriers to uptake, namely that there is too much untargeted information out there, and potential users do not know how to identify what is and is not of relevance and utility to them.

Other programme-level dissemination activity

The only other programme-level documentation we could identify that in any way attempts to convey information about the research undertaken within the programme and the results achieved is the EngKaR ‘Progress Reports’ produced annually by

¹² These were identified through a questionnaire survey of engineers and a workshop held in Kenya involving practitioners / policy makers

DFID. These reports typically contain very brief statements about the programme itself, followed by half-page summaries of all live or recently completed projects in the portfolio. They are therefore useful for anyone with a general interest in understanding the range and current status of the projects being supported at any one moment in time, but do not appear to serve any other useful purpose.

There is, however, one high point to speak of with regard to ‘cross programme’ dissemination. Project funding was used flexibly to support the ‘Hands On’ initiative, an award-winning multi-media communications project that combines TV, radio, web and printed materials to deliver information and knowledge to a global audience. The project, which is a joint venture between the international communications development agency, Television Trust for the Environment (TvE) and ITDG, consists of:

- Thematic short TV programmes broadcast on BBC World and covering a range of subjects including energy, enterprise, agriculture, shelter, tourism and ICTs
- Audio programmes that can be downloaded from the Oneworld Radio website
- Case studies that are produced to provide further information on each programme, available to download from info.tve.org/ho
- An enquiry service provided by ITDG to answer questions sent via the internet, fax or mail

The ‘Hands On’ TV programmes are broadcast to a potential audience of 253 million households in 200 territories and have been translated into many languages including Khmer, Tagalog, and Sinhalese. Following transmission by the BBC the programmes are versioned into Chinese by TvE’s partner China Central TV (CCTV) to reach a further 400 million Chinese-speaking households.

The TV programmes are interesting because they show a side of development that rarely appears in the media – individuals, communities and businesses that are adopting technologies and management practices that substantially improve the lives of those concerned. The project has provoked the biggest audience reaction in TvE’s 18-year history. Thousands of viewers from around the world have written, faxed and e-mailed ITDG’s Hands On Technical Enquiry Service to find out more after each broadcast. This has served to demonstrate that there is a huge global demand for practical engineering solutions that can be used by local communities to help alleviate poverty.

While the ‘Hands-On’ projects have undoubtedly been a communications success story, EngKaR is just one among many contributors to that initiative, and has only had a hand in a small proportion of the featured stories. While the projects have demonstrated that there is demand for and interest in this type of material, there remains a lack of hard evidence about how project results are actually being exploited in developing countries, and to what benefit.

3.2.6 DFID procedures

We asked project leaders to provide ratings of various DFID/EngKaR management procedures. The results obtained are shown in Exhibit 12. There is something of a mixed picture, with DFID’s application, reporting and payment procedures each being

rated as good or very good by most project leaders. Each of the other management procedures listed in the Exhibit was rated as acceptable, poor or very poor by the majority of project leaders, suggesting that there is room for improvement in terms of how these aspects are organised.

Exhibit 12 Project leaders’ ratings of EngKaR management procedures (n=74)

	Poor or very poor	Neutral	Good or very good
Application procedures	19%	26%	55%
Contract negotiation procedures	21%	45%	34%
Payment procedures	8%	13%	79%
Reporting procedures	13%	26%	61%
Procedures for amending project plans	39%	20%	41%
Monitoring procedures	22%	38%	40%
Programme communications (internal)	28%	32%	39%
Programme communications (external)	27%	41%	32%

Procedures for amending project plans attracted the most criticism overall, with 39% describing DFID’s handling of this aspect as poor or very poor. It is not unusual to find disagreement on this issue, with the research funders seeking to ensure that the projects are carried according to agreed plans, and the research performers seeking the flexibility to deviate from those plans where necessary. Many of the research performers feel that the programme’s rules require the projects to be ‘micro-managed’, with any deviations, however minor, having to be subject to an application, approval and amendment procedure. Whilst many do not feel that this level of scrutiny and administrative control is warranted (i.e. it is non value adding) the main bone of contention has been the lack of internal human resource within DFID to manage these processes. Participants complained that it could take months to obtain approval for what are only minor modifications, with resultant delays to project progress. Many participants feel that DFID’s programme managers have been ‘swamped’ with other things, that the situation has deteriorated in the last few years, and that simpler arrangements or more management resource would be required to improve the situation.

Programme communications, both internal and external, also attracted a good deal of criticism, with over a quarter of participants describing these aspects as poor or very poor. Comments supplied suggest that participants would welcome more feedback from DFID on progress reports and project outputs and better information exchange with, and engagement by, DFID’s country desks and staff. Other aspects of programme management that attracted low ratings – monitoring procedures and contract negotiation procedures – suffered from similar problems. Basically, the research teams would welcome more input, advice and guidance to their projects, with that advice delivered in a more timely fashion.

Our interviews with participants suggested a polarisation of views depending on whether the researchers had to deal with a DFID advisor or an external contractor. On the whole, the research community has regarded DFID’s own Sectoral Advisors very positively, with most interviewees complimenting the level of professionalism, expertise and engagement by DFID officers. Any concerns raised tended to relate to

the fact that these key personnel have often had multiple roles and responsibilities within the organisation, and have rarely been able to respond as quickly or as fully as the researchers might hope. The vast majority of negative comments (about contracting, monitoring, variations, etc.) actually related to ‘contracted-out’ management, where DFID has employed one set of research contractors to manage and oversee the work of the rest. Much of the work done by these external contractors is seen as non-value-adding, with too great a focus on ‘administrative’ performance, i.e. getting the contracts concluded on time and in line with the original plan.

3.2.7 Advice and assistance provided by DFID officials

The questionnaire collected views from participants concerning the utility of the advice and assistance provided by DFID officials at various stages in the lifecycle of their project. The results are summarised in Exhibit 13 below, and reveal that DFID officials have provided advice and/or assistance to most projects at each stage of the project cycle, and in the main, this assistance was rated as having been helpful. The results also show that

- Projects are more likely to receive assistance from DFID prior to or during implementation, and less likely to receive help during their exploitation phase
- Assistance provided during the exploitation phase tends to attract lower ratings overall, especially when that advice comes from DFID officials based in-country

Exhibit 13 Project leaders’ ratings of advice and assistance provided by DFID officials (n=74)

Timing of assistance from DFID officials	% of projects receiving input	Rating provided		
		Unhelpful	Neutral	Helpful
Prior to proposal submission	80%	2%	47%	51%
During contract negotiation	95%	4%	36%	60%
During project implementation (UK)	81%	8%	29%	63%
During project implementation (in-country)	64%	8%	42%	50%
During exploitation phase (UK)	57%	18%	43%	40%
During exploitation phase (in-country)	51%	8%	56%	36%

Most R&D funders ‘front-end load’ their work with projects, putting great effort into assessment and contracting and then devoting rather less to monitoring and ensuring that outputs are delivered and the intended outcomes are achieved. Where, as with the EngKaR programme, the absorptive capacity of the intended beneficiaries is weak, funders need to be more involved in the entire project life cycle, not least to ensure that useful results are in practice – as well as in the proposal – linked to use.

3.3 Programme Impacts

Before going on to review the available evidence concerning programme impacts, it is worth pointing out that the EngKaR programme does not have any testable objectives against which the evaluators could judge programme progress. The study cannot therefore ‘pass’ or ‘fail’ the programme in terms of its effectiveness – it can only arrive at judgements as to the kinds of impacts the programme appears to be having and make recommendations as to how those impacts can be improved. Equally, the

diversity of project impacts as well as the difficulties of monitoring and measuring them means that it is not possible to make comparisons of impacts across different sectors and conclude that one provides more poverty-alleviation than another.

3.3.1 Impacts in terms of knowledge production

There is little doubt that EngKaR has been successful in generating a wealth of useful and relevant information, and has made a significant contribution to knowledge within the engineering, infrastructure and urban development fields.

All our technology experts told us that the EngKaR programme has enhanced the reputation and profile of DFID internationally and has helped to ensure that the UK remains one of the leading contributors to global knowledge in the sectors covered by the programme. For example, of the 25 papers selected for presentation/publication at the World Bank Urban Research Symposia in 2002 and 2003, five were based on projects funded through the EngKaR programme.

It is important to underscore that the type of knowledge produced by EngKaR projects may be, but is not necessarily, new to the world. In many cases, it involves packaging and developing existing knowledge in order to make it applicable. For example, generating a handbook to describe how to set up safe sanitation in a hastily built refugee camp involves no knowledge that is new to the world. The value of the project lies in codifying existing knowledge and in making it accessible. Equally, a new cook-stove design is not new knowledge. Databases of engineering parameters for road building or techniques for mapping arsenic in groundwater, like the stove design, represent valid engineering knowledge rather than the more theoretical knowledge we associate with the ‘basic’ sciences.

3.3.2 Impacts in terms of take-up and application of results by users in DCs

Our questionnaire survey asked project leaders to indicate the types of benefits that EngKaR projects have for their intended target audiences, most of which are in developing countries. The results, which are presented in Exhibit 14, suggest that

- **Improved planning and management capability** is the most widely cited type of benefit arising from EngKaR projects – the *main* impact for 28% of projects and a top-three impact for almost two-thirds (61%)
- **Improved knowledge and understanding of technical issues** is the next most widely cited benefit, figuring as the primary benefit for almost a quarter (23%) of projects and a top three benefit for around half (51%)
- **Improved understanding of poverty alleviation measures** is the third most common type of benefit, with 17% of projects citing this as the *main* type of impact and almost half (47%) citing this as a top three benefit

In comparison to the benefits cited above, relatively few projects have helped their target audience to develop, adapt, understand or access specific technologies. This helps to underline the fact that, increasingly, much of the portfolio is not ‘hard’ engineering research or technological innovation, but is instead aimed at improving understanding of how best to plan and manage poverty alleviation measures, particularly those related to the provision and maintenance of infrastructure. This is a strength of the programme. The great figures in engineering history tend to have

combined ‘hard’ engineering with management and logistics – which only split into separate disciplines in the early part of the Twentieth Century. Reunifying the ‘hard’ knowledge with knowledge about its organisation and context is absolutely necessary in order to use engineering to make a difference in the context of developing countries.

Probably the most significant weakness in EngKaR has been failure to connect the ‘hard’ project work to its context in such a way that the projects impacts are sustainable. For example, our visit to India showed that a technically effective project¹³ to help small energy-intensive firms increase their energy efficiency had good effects in two potteries. However, in the absence of an advice infrastructure for small firms or of anyone with a commercial interest in helping reduce energy consumption, the results of the project appeared to have gone no further (at least in India). In effect, the failure to build in interests that will exploit results after the end of the project means that the project’s failure to obtain wider influence was designed in from the start. Many projects suffered from this weakness, which ultimately stems from a technology-centred approach to the projects, where ‘dissemination’ is the last step in a process of technological development. Dissemination and exploitation are most likely to occur in projects that start with beneficiary needs and build in a link between technical results and these needs. In the best cases, such links take the form of stakeholders whose mission or selfish interest is served by exploiting project results.

Exhibit 14 Project leaders’ views of main impacts on target audiences (n=75)

	Share of project leaders citing this as the main benefit	Share of project leaders citing this as one of the top three benefits
Improved planning and management capabilities	28%	61%
Improved knowledge & understanding of technical issues	23%	51%
Improved understanding of poverty alleviation measures	17%	47%
Approved ability to apply new technology	9%	21%
Improved capacity to develop policy and strategy	8%	40%
Improved access to specific technologies	7%	20%
Improved understanding of specific technologies	4%	16%
Improved ability to adapt new technology	4%	13%
Improved policy framework for new technology	4%	8%
Improved ability to develop new technology	1%	1%

While the questionnaire provides some indications as to the sorts of benefits that project leaders expect to arise, there are few hard data available on how and where results have actually been applied, and the nature and scale of the benefits arising. There have been some isolated attempts to determine project impacts in certain specific cases, but no consistent process by which to really track and understand impacts in developing countries.

¹³ R7143

The impact of the portfolio is more questionable. Based on a review of selected projects, it seems likely that positive impacts in most cases will appear in future. There are, however, no mechanisms for ex post evaluations of EngKaR research projects and impacts will hardly be documented. The research organisations do not have any responsibility for identifying impacts in a systematic way and are not the most appropriate bodies for this task.

Transport Review

Our independent experts were (already) aware of some specific positive impacts the programme has had, and believed that the projects they reviewed in depth would all, to a greater or lesser extent, have a beneficial impact on users in developing countries, where those users have access to and are able to apply the results. Our own work in-country provided further indications that users are accessing the outputs in many cases, and where they do they are able to learn from the research and expect to benefit from it. There remains, however, some doubt as to the extent of the impacts among the wider pool of potential beneficiaries who have not interfaced directly with the project during its implementation. Whilst we have often found the research to be of *interest* to a very large potential target audience, rarely have we encountered a situation where large numbers of users across many countries are actually engaged with, and able to *act* on, the results.

A workshop held in India as part of this study revealed that many stakeholders believe that individual DFID-funded projects have little direct influence, but that as part of longer-term programmes, or by contributing to the participants' capabilities, they have contributed to a longer-term evolution of policy and practice. Research undertaken by one project into energy needs of the urban poor attracted the interest of an international donor wanting to fund a major project in the area, and serendipitously achieved substantial policy influence. Many project holders felt that more could have been achieved if DFID India supported the projects more effectively. Some participants at the workshop felt that in many areas the Government of India already has good policies, but does not know how to or lacks the resources to implement them.

Many of the potential users we spoke to in both India and Kenya argued that in order to achieve substantive impacts the messages have to get through to policy makers, and all too often those working on EngKaR projects in-country lack policy influence. Based on a synthesis of the country studies work, it seems that policy influence is maximised when projects

- Engage with policymakers (unanimous)
- Engage with existing policy processes
- Are part of broader stakeholder programmes
- Have longer term horizons
- Generate research that is credible
- Collaborate with other groups and ongoing initiatives
- There is already a policy demand
- Donors also push the initiative

There were some suggestions that DFID's own behaviour can undermine the impact, or potential future impact, of work funded by the EngKaR Programme. The main concerns related to

- Rapidly changing policies and priorities, with certain issues being fashionable within DFID one year and not the next. Whilst the programme and its priorities need to remain relevant, research simply cannot keep pace with fast-changing policy priorities. There is a danger that funding is focused on projects that are 'topical' but actually do little in practice, with less 'current' but ultimately more important issues being overlooked. It can also mean that the funder loses interest in the research prior to its conclusion, indicating to the contractor that the situation has 'moved on' and that no follow-on or follow-up work is required
- A general inability of DFID's country offices to engage with the work. Although the research teams typically try to engage DFID's country offices in the research, both at the outset of projects and then again as results begin to emerge, these efforts are rarely successful. It is well understood that, in order to realise substantive impacts, projects need to engage with as wide a range of local stakeholders as possible. DFID's country offices are seen to hold the key to this, but rarely do they have the resource to engage with and lend their support to work that is being funded in the UK. Most country offices are busy trying to devise and implement their own measures, and simply do not have any slack to deal with all the various development projects and activities going on in that country

Despite some positive indications that users are engaging with and benefiting from the outputs of the programme, our experts were concerned about the general lack of *evidence* on the impacts of DFID's investments within each area. Whilst this study has been able to gather some feedback from users in (two) developing countries, we simply have not had the time or resource to trace the impacts of the many hundreds of EngKaR projects funded down through the years. DFID itself needs to do more to determine the impacts of the projects. Given that it has been funding work in these areas for 15 years, DFID should by now be optimising its buying process based on a solid body of evidence as to what actually works in practice.

Even the researchers themselves often have little overview as to how or where the results of their work have been applied in practice, or to what end. Inherently, they are likely to be able to see direct results of their projects, but the externalities – especially the re-use of EngKaR knowledge outside the programme – are difficult for them to observe, even though these form a major part of the justification for funding this kind of programme that produces knowledge for the public good. Project leaders can talk about expected benefits and likely impacts on the poor (see below) but there is a dearth of hard evidence as to actual take-up and real benefits. In their defence, many contractors pointed out that the funding they receive does not extend far enough to allow the tracking of impacts, but having said that, most do *not* believe that substantive impact assessments at the project-level would be feasible or prudent in the majority of cases. It is a truism that projects of the nature and scale that have been funded through EngKaR are rarely able to deliver up 'big results' on their own. As such, there is a limit to what is appropriate in terms of expenditure on promoting outputs and tracking uptake.

3.3.3 Expected and realised impacts on the poor

Our questionnaire survey also gathered information from project leaders on the types of impacts the projects are expected to have on their ‘ultimate beneficiaries’ (i.e. poor people). The results are shown in Exhibit 15 and reveal that

- **Improved infrastructural services (water, sewerage, roads, etc.)** is the most widely cited type of benefit delivered to poor people through EngKaR projects – the *main* impact for 32% of projects and a top-three impact for just over half (52%)
- **Improved environmental management** is the next most widely cited benefit, figuring as the primary benefit for around one in eight projects (12%) and a top-three benefit for just over half (52%)
- **Improved financial income** is the third most common type of benefit, with 12% of projects citing this as the primary type of impact and over a third (39%) citing this as a top three benefit

Improved social, cultural or political environments was also a top-three benefit for a significant proportion (28%) of the projects. By comparison, the other categories of benefit – improvements to healthcare, employment, housing, education and training – were cited relatively infrequently as the key areas of impact for poor people. Some of the respondents cited other types of ‘end-user impacts’ than those shown below. In most cases these other benefits were improved *access* to one or more of the basic services (such as food, water, energy, housing) or greater awareness or autonomy in managing such services.

Exhibit 15 Main impacts on ultimate beneficiaries (n=75)

	Share of project leaders citing this as the main benefit	Share of project leaders citing this as one of the top three benefits
Improved infrastructural services (water, sewerage, roads)	32%	52%
Improved environmental management	12%	52%
Improved financial income	12%	39%
Improved healthcare services	5%	13%
Improved social, cultural or political environment	3%	28%
Improved employment	3%	12%
Improved housing	3%	9%
Improved education	3%	7%
Improved training	1%	17%

Project leaders of *completed projects only* were asked whether their project had generated any tangible economic benefits for participants/beneficiaries in poor countries. Of the 45 people who provided an answer, just over half (51%) stated that their project *had* led to concrete economic benefits. Qualitative descriptions provided by the project leaders concerning the nature and scale of the benefits derived were often rather general in nature and did not fully convey who had realised the economic benefits or how (e.g. “the project has influenced environmental policies and thereby contributed to more sustainable livelihoods”). However, other project leaders

provided more specific explanations as to how their project had led to economic benefits. Examples included

- Profit generation via low-value urban waste recycling, which not only provides enhanced employment opportunities for recyclers/sellers but also leads to cost savings among households who can purchase less-costly (recycled) fuel products
- Individuals developing their own water selling enterprises as a direct result of improved access to appropriate means of transport
- Utilisation of quarry waste in new commercial products (e.g. ceramic tiles) which in turn has improved employment opportunities for the local (very) poor
- Improved mining techniques leading to 20% higher yields for small-scale gold miners

Many of the remaining project leaders stated that it was too early for economic benefits to flow from the project, arguing that these would only be realised in the medium-long term and would be realised indirectly via improved planning or management of future infrastructure and urban developments. In other cases, researchers claimed that their projects had failed to achieve substantial impacts on poor people due to the lack of funding to scale up. A given community engaged through a project might be ready to go further, but rarely if ever would the project have sufficient funds to help the community take the initiative forward or scale it up. As such, it is not uncommon to be told at the community-level that “We have a document, but the community has not benefited.” The general perception is that for pilots or demonstrations to be useful they must contain an approach that can be mainstreamed (i.e. leading to sustainability), but that many projects do not work this through. The key is to get commitment to implementation from within the community itself, and this can often only be secured if the necessary resources and skills are made available and sustained over a sufficient period of time. Where the route to sustainable implementation needs to involve a private sector actor – for example, a manufacturer of a design produced in EngKaR – such an actor needs to be in place in the project and have both the resources and the needed incentives to exploit the project results. In most cases the EngKaR projects we have seen have not managed to do these things. As a result the work is interesting and potentially valuable but is not sufficiently connected through to other funding streams, resources or initiatives that could support the roll out and application of results with poor communities.

3.3.4 Impacts in terms of supporting research capacity in developing countries

Whilst not the main goal, strengthening the ability of developing countries to produce and manage their own knowledge has formed part of the objectives of the EngKaR programme. By promoting participatory approaches and the involvement of stakeholders in developing countries, DFID has helped to ensure that many of the projects have been undertaken collaboratively with research groups and engineers from the south. Where this has happened, benefits in terms of improved knowledge, experience and capabilities are clearly being realised. Our interviews with in-country participants showed that they enjoyed working with their UK-based partners and felt that they brought useful technical expertise, opportunities to learn from elsewhere and scientific credibility to the party. However, many felt like the junior partner in the

work, and told us they were only really involved in projects once their agendas had been set. In some cases they had to spend a lot of time convincing their UK-partners of the need to change project design to make it more locally relevant. Furthermore, improved ability among DC researchers to understand and undertake this type of work themselves does not necessarily imply that they will have the financial means or opportunity to do so.

These positive contributions notwithstanding, we have not seen much evidence of specific or overt attempts to help build research capacity or capabilities in DCs. There is an obvious UK lead to most of the work. In order to redress this situation, much more specific and explicit attempts to build capacity would have to be put in place. In part this is already happening through DFID's country programmes, and it is arguably not appropriate for every research project in every area of every programme to try to do this as well. Often projects are loaded down under the weight of the various 'priorities' they are expected to address. Our work in-country revealed that capacity building is a major issue for stakeholders in the south, and is something that DFID does need to do more to address. However, we believe that this requires dedicated initiatives, undertaken in concert with other donors and agencies, in order to be meaningful, and we would not support a requirement for capacity-building to be addressed by every piece of research that DFID funds.

3.3.5 Impacts in terms of supporting research capacity in the UK

It is not DFID's responsibility to maintain a UK capability in research for development. In fact, this is not anybody's responsibility, which is a significant failure of governance in the UK. However, it is nonetheless in DFID's *interest* to ensure that the UK has a sufficient body of expertise in those areas where DFID is active. The Department makes extensive use of an external contractor base that is both highly skilled and highly networked in development research, and which provides a vital adjunct to DFID's own in-house capabilities.

The EngKaR programme began at a time when a number of Government Research Laboratories, such as TRL, were in the process of being privatised. Historically these organisations received 'core' funding or block grants that enabled them to undertake long-term programmes of work oriented towards the needs of specific Government Departments or society in general. DFID had been able to rely on the work of these national centres for many of its research and information needs, and could call work off in a variety of ways. Following their privatisation these organisations have had to win most if not all of their research income through competitive processes, usually on a project-by-project basis.

The EngKaR programme can be considered as one that has helped to support these organisations through a period of transition from 'core' Government research funding to 'competitively won' research funding, helping to provide at least some continuity in the work they have been undertaking. As such, the programme has had a significant impact in terms of the maintenance of research capability in the UK in the infrastructure and urban development fields. Many UK research teams have, with DFID support, built their capabilities and reputations over long periods, and in recent years, EngKaR projects have been an important and sometimes central component of their overall portfolios.

It has contributed to the maintaining of UK based strengths partly by enabling these institutions to build their capacity and recognition in the field so that they have also been able to receive funding from other international sources.

Energy review

The programme has enabled centres of learning in the UK to increase their international effectiveness and competitiveness by supporting the development of new institutional knowledge and experience through research on urban development in less developed and transitional countries. Economic returns have been realised not only as increased foreign student fees to these institutions, but also as exposure to UK firms that have provided consultancy services.

Urbanisation review

Many of the research organisations funded through EngKaR are global leaders in their respective fields, and by supporting these organisations DFID has helped to build its own profile and reputation abroad. The recent hiatus in funding caused by the closure of the EngKaR programme has already had a detrimental impact on the UK research community, with some key individuals leaving to find new posts elsewhere and some research units seeing their income cut by as much as two-thirds. While DFID is not responsible for maintaining research capability within the UK, its withdrawal of funding in the engineering / infrastructure area is nonetheless beginning to erode national capability that has been built up over very many years.

3.3.6 Impacts in terms of guiding DFID policy and investments

There is very little evidence to suggest that the research programme interacts strongly with or informs DFID's wider policies and programmes elsewhere. This is one of the weakest areas of the programme:

It is in the third area, using the expertise for the work of DFID and to guide the direction of DFID investments [in energy] in developing countries that we have found the least evidence of impact and the maximum scope for improvement. If the research results are meant for implementation, one of the main criteria guiding the process, it is surprising that DfID does not see itself as a user of the results. In our interviews the researchers were unanimous that there was little interest or available mechanisms for DfID officers in the countries to link with the researchers and their results. DFID has investments in energy projects that are much larger than the entire research budget of KAR energy - it is unfortunate that there are no mechanisms for learning between the research and the investments.

Energy review

Failure of the programme to identify research problems (knowledge gaps) that relate to other international development efforts that DFID is pursuing means that often the research results have no natural home or target audience that is both ready and waiting for the results and has the means to actually effect change as a result of the new knowledge. Because the programme is often not strongly related to DFID's other work, each project is pretty much left to its own devices in terms of achieving any kind of impact, and it is often just as difficult to get DFID to pay attention to the findings as it is to persuade potential users in the south. Weak inputs by DFID at the planning stage in terms of the identification of critical knowledge gaps, and failure to connect the research projects and their results into DFID's wider activities, have both served to limit the uptake and ultimate impacts of these investments.

In our view DFID, both in the UK and in-country, has taken too much of a 'hands-off' approach to the work in this area, overlooking the importance of its own role in focusing and helping to exploit the research. DFID has also underestimated the potential of the research to help to inform its own policies and programmes.

4 Conclusions and Recommendations

This final section of our report begins by setting EngKaR in a wider theoretical and institutional context. This is useful because modern research about research and innovation has a lot to say about likely success factors for such a programme. We then draw conclusions and make recommendations about how to continue and improve the important effort represented by EngKaR.

4.1 Theoretical and Institutional Context

Our findings about EngKaR resonate well with what we know from the theoretical and research literature more generally on the relationship between research and socio-economic changes, especially innovation. EngKaR's original design corresponds to an earlier and now out-dated conventional wisdom about this relationship. In the last few years, the programme has been changed significantly and is now much more aligned to current thinking. Our main conclusion is that this process of intellectual modernisation has to go further, so that the programme can fulfil its promise of tackling key barriers to poverty reduction in specific places while providing knowledge that is also sufficiently generic to generate externalities: providing the knowledge to help others reduce poverty in other places.

Views about the relationship between research and innovation¹⁴ have gone through significant changes in the last 40-50 years – both among innovation researchers and among policy makers. While the 'linear model' idea that basic research leads more or less automatically to innovation and wealth ('science push') was accepted in the 1950s, it was increasingly challenged during the 1960s and into the 1970s by the idea that 'needs pull' was more important. By the early 1980s, it was understood that 'coupling' between scientific or technological opportunities and the needs of users was key. The relative importance of push and pull in this coupling appears to vary among different branches of industry and at different points in the product or industry life cycle. However, in the 1980s – and, to a considerable extent, still today – the linear model retained a strong influence on policy, on the popular imagination, and on EngKaR.

Since 1990, the idea of 'systems of innovation' has become widespread, and with it an emphasis on the importance of networks and interlinkages in the innovation process – both among firms and between industry and research. There has been growing concern with knowledge users' 'absorptive capacity' – that is, their ability to perceive external technological opportunities and to absorb the knowledge needed to make use of them. As a consequence of these changes, innovation policy makers have tended to move away from instruments that give money to single actors and increasingly invest in partnerships and, more recently, innovation networks. The idea is to secure the needed coupling between push and pull, to strengthen the network relationships that help innovation and to support the growth of absorptive capacity.

¹⁴ For a discussion of modern research and theory on research in the context of development, see Erik Arnold and Martin Bell, *Some New Ideas about Research for Development*, Copenhagen: Foreign Ministry, 2001

The diffusion of innovation systems thinking into aid policy has been slow, compared with its take-up in OECD policy. Bezanson and Oldham recently reflected on the implications of this diffusion under the title 'rethinking science aid' and indicated four important changes that would occur if the 'innovation' perspective were adopted in science aid¹⁵

First, funding for science and technology would not be generic (i.e. directed at building general science and technology capabilities in developing countries) but focused on a relatively small number of specific problem areas that require urgent solutions, and that cannot wait until generic research capacity is built in the developing world.

Second, investments in science, technology and innovation would be predicated on industrial strategies aimed at economic growth, within which international support for science and technology would largely be demand led. This means not only responding to conventional market signals but also exploring new 'demand-based' models of scientific and technological aid, such as ... public-private partnerships...

Third, the linear knowledge model linking research to production would be explicitly avoided through policy instruments that seek to differentiate, by countries and by regions, the best ways to create, acquire, assimilate, use and diffuse knowledge.

Finally, the emphasis in financing research would be on developing research networks in the developing world which include research partners in the developed world, and which can be certain of receiving long-term financial backing.

The recent House of Commons Select Committee report on the use of science in UK development policy stresses the importance of science for development, the need for DFID to strengthen its policies and its personnel in this important area, to increase the involvement of beneficiary countries in developing its research strategy and the need to evaluate the outcomes of research. This does not mean that DFID should invest in basic science¹⁶. "Investment to strengthen the whole system of innovation in developing countries is required..." – in the private as well as the public sector.

The creation of a central research function has enabled DFID already to start working on these principles, increasing the importance of research in the Department's work. The 2002 review *Research for Poverty Reduction* found that many of DFID's research programmes were having positive effects but urged that DFID should

- Bring all research (previously managed in sector programmes, such as health, natural resources) together under a Central Research Department, in order to eliminate duplication and to generalise across DFID research the best practice from the different funding strands

¹⁵ Keith Bezanson and Geoff Oldham, 'Rethinking science aid,' editorial in SciDevNet, 10 January, 2005 www.scidev.net

¹⁶ There are well-documented examples of investment in basic research alone in developing countries leading to the creation of expensive and irrelevant elites, detached from the rest of the innovation system and unable to do good science owing both to lack of recurrent income and to isolation from the world scientific community. See J L Enos, *In Pursuit of Science and Technology in Sub-Saharan Africa: The Impact of Structural Adjustment Programmes*, UNU/INTECH Studies in New Technology and Development, London: RKP, 1995; Jesper Carlsson and Lennart Wohlgemuth, *Capacity Building and Networking: A meta-evaluation of African regional research networks*, Department for Evaluation and Internal Audit, 96/45 Stockholm: SIDA, 1996

- Focus on *key researchable problems*, and bring to bear whatever combination of disciplines are needed to tackle them
- Give more support for *developing country research capacity*
- Give more attention to *getting research into use*
- *Position DFID's research in its broad international context*, rather than imagine it as a stand-alone programme
- *Expand international funding*, the attention we pay to the *private sector*, and increase our *collaboration with other UK government support to research*¹⁷

These principles are highly congruent with our own findings and conclusions. DFID has adopted these principles in its new *Research Funding Framework* and according to the Framework Document has suspended the EngKaR programme or a replacement activity in infrastructure pending the results of this evaluation.

Infrastructure and engineering issues are important for development and there are gaps in the knowledge available to those doing development, so a DFID programme to create, package and exploit knowledge in these areas is important. A key challenge is to fund research that is both a global public good and actually has an impact upon policy and practice. So far, EngKaR has been too diffuse to have enough impact. DFID needs to focus its efforts on a smaller number of issues that are important for development and cluster its efforts around these – both thematically and geographically. The EngKaR resources need primarily to be focused on longer term, programmatic funding to tackle key technical and policy challenges. The areas involved need to be identified together with DFID programmes in key beneficiary countries so that they are connected to DFID's and other donors' wider strategies. They should result in a series of 'knowledge platforms' that package the knowledge gained in such a way that it can be accessed and used beyond the handful of countries engaged in its development. Such knowledge platforms should be attached to strong research centres in the relevant field and should combine web- and paper-based publication with proactive events in the developing world. They should be funded partly to link new prospective knowledge users to existing ones and to influence donors' strategies towards exploiting the knowledge generated, so that the investment is valorised across a larger volume of activity.

It is important to build relevant research and engineering capacities in developing countries. However, in order for the UK to maintain and operate such a programme, it is also important that the UK also retain development-relevant research capacities in engineering and infrastructure. This balance needs to be reflected in the way future projects are funded and in the way DFID co-operates with other UK research funders. The interruption to EngKaR funding has already damaged UK capacity and the relevant research communities need some measure of continuity and certainty as a basis for their planning, otherwise the UK's ability to add value through this type of programme will wither.

Creating a central research function in DFID has an important symbolic as well as a practical value in focusing the attention of the organisation on research. Large companies' experience and practices in research organisation over the past 20-30 years are, in this context, worth noting. A central research organisation normally

¹⁷ Quoted from *DFID Research Funding Framework 2005-2007*, London: DFID, 2004

struggles to stay relevant to customer-facing parts of the company. However, those who fully decentralised research then found that, over time, the company lost sight of technology as a whole and tended to become bogged down in short term incrementalism. Increasingly, large companies deploy a mixed model, with a strong central co-ordination and planning function in which the various customer-facing business units have a strong say about priorities. The process we propose for developing priorities in a future engineering and infrastructure research programme involve exactly this needed creative tension.

4.2 Conclusions

Our overall conclusion on the EngKaR programme is that it has supported a collection of individually relevant, well-conducted projects in areas of great importance to international development and poverty alleviation efforts. The projects have adopted practical, poverty-focused, participatory approaches in researching practical aspects of infrastructure provision, maintenance and engineering appropriate for developing countries. They have produced a significant body of information, insights and practical guidance, which has been well packaged and communicated, particularly in recent years. As a result, the programme has made a useful contribution to the available body of knowledge in each of the Sectors addressed.

The extent of take-up and application of the work in developing countries is less clear. In some areas the impacts of the projects appear to have been or are expected to be high, but little attention or resource has been devoted to managing the process of realising and assessing impacts. The programme has involved a broad range of actors from the UK and developing countries and has contributed to the development of capabilities and competencies on both sides, but there are concerns as to the extent of impacts outside those directly engaged in individual projects. The programme has undoubtedly made a positive contribution to DFID's (and the UK research community's) reputation in developing countries. This matters, because it fosters the legitimacy needed in order to be useful.

Whilst the programme has supported a strong body of work, we are concerned that it has not been sufficiently focused on a manageable number of clearly defined and reasonably widespread problems that are known to be hampering poverty alleviation and development efforts. In effect, its bottom-up character, selecting independent projects according to a general set of quality and relevance criteria, has caused fragmentation. Most of the projects have been rather small, stand-alone efforts and as a result the portfolio lacks sufficient critical mass in any one area to really make a substantial and visible difference. Future funding in these areas should seek to tackle fewer problems but in a more comprehensive and coordinated way, so that projects are mutually reinforcing. It should be focused squarely on issues that are known to be affecting many developing countries and where there is a clear understanding of uptake pathways and how the new knowledge generated will lead to pro-poor benefits. It should also seek to contribute to the wider international effort rather than only be a 'British' research effort.

4.2.1 Conclusions on planning

There is huge scope for improving the effectiveness and efficiency of policies, investments and actions in relation to each of the main sectors covered by the

EngKaR programme. Much of the developing world still lacks proper access to basic infrastructural services such as water and sanitation, transport and energy. The major challenge facing any programme operating in these areas is the sheer number and diversity of the problems and issues that need to be addressed, and the fact that any new insights or solutions developed in one country or context may not necessarily apply elsewhere.

Given the number, scale and diversity of the problems, a programme operating in the general engineering / infrastructure area cannot resolve them all across all developing countries. Programmes need to be focused on issues that they stand a good chance of being able to resolve, that are demonstrably important and where resolution will be useful to beneficiaries. Projects need to be clustered so that they are mutually supporting –in terms of content, via the support of critical mass in research performance (especially in the South) and in terms of context, so that they operate in situations where beneficiaries and funders can successively learn to make use of their results.

Through changes to the assessment process in recent years, DFID has promoted a more innovation-based, participatory and poverty focused research portfolio. However, the planning process has not gone far enough. Rather than focusing the programme on a discrete number of clearly defined problems where a lack of knowledge is known to be hampering development efforts, EngKaR simply specified a number of general areas within which research was to be funded. Additional ‘generic’ guidance has helped to ensure that the research was aligned with DFID’s current thinking and priorities, but the programme itself remained fairly open as to the range and diversity of research subjects and topics it was prepared to support. The portfolio is highly fragmented. Individual projects, though relevant and of a good general quality, are in most cases not sufficient fully to resolve problems or deliver major impacts on their own.

Programme-planning processes should develop mechanisms involving Developing countries and other donors to identify and prioritise specific clusters of problems that appear tractable and where research/new knowledge can feed into efforts to resolve the problems. Research results needs to be able to influence actors who are actually engaged in delivering poverty alleviation measures. This cannot be achieved in a programme that is researcher led, with ideas defined bottom-up by a research community in the UK rather than by DFID in concert with intended beneficiaries in developing countries. Fundamental weaknesses of the programme are that it has not sought to establish the current state of knowledge and main knowledge gaps in each area of its operations, provided a planning link to beneficiaries or identified the way in which externalities will be achieved.

There is a clear need to provide a better focus for research in these areas in the future, including by linking to DFID’s other policies and programmes. It is important not to pre-judge where these areas are, but to identify them in a way that involves intended users as well as those with the resources and influence to put solutions into practice. Future funding should be oriented first and foremost to ‘directed’ activity to address identified knowledge gaps, with a dedicated (smaller) fund for ‘responsive’ work to support the very best ideas in new and emerging areas or those not covered by the directed activity. The weaknesses of trying to decide everything through planning are

well known. Through such a mixture of ‘top down’ and ‘bottom up’ approaches, the programme can be both relevant **and** have scope to capture both unpredictable research- and needs-driven opportunities.

4.2.2 Conclusions on implementation

While more focus would be desirable, the organising framework of the programme combined with a competitive application process has nonetheless led DFID to purchase studies that are relevant at the individual project level. The projects we reviewed were generally relevant to their intended target audiences and the needs of poor people. Few were disconnected from real problems and real people who could benefit from the research. The annual competitive bidding processes were well-organised and managed and followed good practice principles in the main, though there were some issues with the application forms themselves, which appear to have become convoluted to the point that applicants found it hard to explain what they want to do and why.

The open competition has also generated large numbers of proposals, with the natural consequence that success ratios have tended to be quite low. Rather than driving up the quality of proposals, this appears to have had the opposite effect, with the quality of bids being quite low on the whole. Recent changes to the process, most notably the introduction of an additional ‘concept note’ stage to weed out weaker ideas more quickly and at lower cost to all parties, have helped to improve matters. However, we remain unconvinced that the basic strategy of inviting UK research teams to generate ideas for relatively small projects (average size of less than £200k) is the right approach in these areas.

Generic guidance issued to applicants as to the sorts of approaches and principles that the programme would like to see have had a positive effect on the strength of the projects. However, in some cases, projects have become over-burdened with the number of policy imperatives that they have tried to react to and the range of functions they have tried to perform. This has resulted in sub-critical inputs across too many fronts, leading to weaker outputs and lower impacts than might otherwise have been attained.

Most of the funded projects were originally conceived by researchers in the UK. Almost all included partners from developing countries but there were barriers to including them fully in project design. Participatory approaches and ‘on the ground’ engagement with stakeholders were strongly encouraged, with the result that most projects have engaged local communities in the work, usually in several developing countries. This means in many cases that there are good levels of connectedness to real people and real problems, guaranteeing a certain amount of knowledge transfer, learning effects and localised benefits.

Projects in the portfolio appear to have been conducted to a good technical standard with few serious problems. High levels of interest and professionalism on the part of the project teams have ensured that most projects were well managed and produced worthwhile results. A general lack of support from DFID in-country, isolated problems with finding suitable personnel, and insufficient resource for communication activities were the main factors that have hampered progress and exploitation of results at the project-level. Some projects also struggled to achieve

their goals due to over ambitious objectives and underestimation of the difficulties associated with working in particular contexts.

The quantity, quality and range of outputs produced by individual projects have improved in recent years, and are currently at a very good level. Most outputs are in the form of written case material, guidance notes or handbooks, but a wider range of media is increasingly being used to package and communicate project results for different types of audience. Projects are delivering outputs in line with their contractual responsibilities. However, some of the outputs were rather too general in nature and were aimed at rather too wide an audience to be really useful from an operational viewpoint.

We were also rather concerned that more had not been done to assess the value of the results obtained and the quality of the outputs produced through the projects through a routine process of project monitoring and ex post assessment. Failure to do this has meant that the programme has not really learnt over time what has been working or not, and why. As a result, those involved in appraising and selecting projects have few performance data available.

Most projects have sought to extract generic lessons from the ‘action research’ they have undertaken. However, because most of the work has been very small-scale, individual projects have often (quite reasonably) produced limited results based on relatively small amounts of fieldwork conducted within relatively restricted geographical areas. As such, they have rarely (on their own) been able to support ‘big’ conclusions that everyone should listen to, nor have they had the means to take their results out to large numbers of stakeholders across many countries. Because the projects that have been supported are in most case unrelated to each other, there is no obvious means by which the results obtained within any Sector or Theme can be ‘added up’.

Project-level dissemination activities have improved substantially in recent years, with most project teams now using multiple routes and media to promote their findings. While the range of approaches adopted is now very broad, and the general quality of the packaging is now quite high, direct communications have often been limited to the mailing of a few hundred copies of a report. Many projects appear to lack the means *actively* to disseminate their results much beyond those stakeholders engaged directly during the course of the project. This means there is a significant gap between the projects and others who can put results into practice. More passive communication channels, such as project websites are increasingly being used, though there is still a long way to go before all of the outputs of the programme are available on-line. Our work in India and Kenya indicates that **active** dissemination is by far the more effective route.

In addition to encouraging stronger dissemination at the project level, DFID has also taken steps to improve programme-level communications, with the Sectoral Resource Centres being the main deliverers of this activity. The standard ‘package’ of a sectoral EngKaR website and a series of biannual newsletters has helped to keep interested parties notified of the work in the portfolio, but there is still relatively little ‘output’ available for download in each Sector (Transport being the exception) and virtually no attempts to synthesise or add up the results across projects. As such,

much of the ‘sector-level’ communication activity constitutes little more than promotion of information about the projects that have been funded, and information about the results and impacts of the work is notable by its absence in most cases.

The ‘Communications and Information Management Resource Centre’ (CIMRC) established by DFID in 2001 has had some success in terms of improving DFID’s internal management information systems and has produced useful guidance on communications activities. However, some of its activities have provided little added value over and above the work of the other Resource Centres, and it has made limited progress to date in improving programme-level communications. There is little that CIMRC *could* do at the programme-level, given that the programme itself actually consists of a very large number of unconnected projects working across a diverse range of issues and areas. However, we do see a continuing need to ensure that all relevant outputs are made available on line so that they can be found and identified by subject and user. We would also welcome a more concerted attempt to develop an overview of the problems that have been tackled and the progress that has been made, across all projects in a given area.

More fundamentally, there does not appear to be a proper communications strategy in place. Such a strategy needs to begin by identifying actual and potential users of EngKaR research results, segmenting them into groups that exhibit similar behaviours, understanding how and through which channels these groups search for information and then deciding how to offer information to them. Without this kind of evidence-based communications strategy, it is not possible rationally to choose, for example, between a strategy that collects all the EngKaR information together on one web site and another that distributes it across resource centre sites. Our prejudice would be for the latter, since at least some of the resource centres are already internationally acknowledged information sources. A few moments searching the World Wide Web for topics tackled in EngKaR makes it clear that most technical information is held on research performers’ sites, and comparatively little on funders’ or programme sites. However, CIMRC’s own work indicates that the major communication and dissemination issues are logically ‘prior’ to making choices between alternative Web strategies. They are to do with EngKaR’s lack of a ‘brand’ in developing countries and the need to encourage potential users to look for information at all.¹⁸ Web-based dissemination needs to be complemented by major, proactive efforts in-country.

On balance we would conclude that DFID has managed the programme reasonably well. In particular it has taken steps to consider how well the projects have been performing, identify potential improvements and effect changes where necessary. DFID’s advisors have played a key role, demonstrating a high level of engagement with and interest in the research, supporting the sectoral work and acting as ‘intelligent customers’. They have tended to be very flexible, allowing projects to change tack, provide joint outputs and use the funding for things other than research. They have been open in terms of the range of activities they have been prepared to fund and flexible in dealing with modifications to projects where necessary. In most cases this flexibility has added value to what would otherwise have been produced.

¹⁸ CIMRC, *Communications and Information Management Strategy for Infrastructure and Urban and Development Knowledge, Appendix A*, report to DFID, Contract No 01 2682, 2002

However, internal changes, most notably the closing of IUDD and the creation of a Central Research Department, seem to have led to a disempowerment of the sectoral advisors. As their presence and effectiveness within the programme was reduced, many programme management functions were contracted out. The research community has not welcomed these changes. Many researchers see the quality of contracted management services as a descent to administrative ‘box-ticking’ and feel that DFID is no longer acting as an intelligent customer.

Contracting out has not been able to overcome problems caused by the programme’s strategy of pursuing its objectives by funding large numbers of relatively small, unrelated projects generated bottom-up by researchers in the UK. More likely, the loss of links to DFID’s other activities and organisational memory is likely to have contributed to the fragmentation.

4.2.3 Conclusions on impacts

While the projects have undoubtedly generated a vast body of interesting and relevant findings and results, there is relatively little evidence available concerning the actual impacts of the programme and its projects in developing countries. Project funding does not extend far enough for individual research teams to track their own impacts in the months and years following the dissemination of results and little has been done by DFID properly to gauge project-level impacts or to aggregate results to the programme level.

Based on the available evidence we can see that the projects have generally good levels of impact within the communities addressed directly through the ‘action research’. There is evidence to suggest that in some areas the more technical work that has built up over time and is reflected in established guidance notes used by engineers in DCs, does have significant impacts that extend far beyond the localities where the research was actually based. In contrast, the newer, more socially oriented projects do not have the same uptake pathways in place and tend to have softer (less concrete) results, so impacts are less visible.

For two reasons, the available evidence does not allow us to conclude that EngKaR work in one sector has led to greater benefits than that in another. A detailed attempt to collect second- and third-order impact data about individual projects would have been massively expensive. This is one reason why we have relied strongly on interview and workshop-based approaches in the South. In practice, such conclusions are in any case close to impossible to reach in the evaluation of R&D.

Reviews of the literature and experience suggest that research is more likely to be taken up into policy in international development if research programmes develop a detailed understanding of: (i) the policymaking process – what are the key influencing factors, and how do they relate to each other?; (ii) the nature of the evidence they have, or hope to get – is it credible, practical and operationally useful?; and (iii) all the other stakeholders involved in the policy area – who else can help to get the

message across?¹⁹ This is the basis for developing an overall strategy and practical activities for ensuring that the programmes maximise their chances of policy influence.

Given the paucity of evidence concerning actual take-up of results and the impacts of the projects, subsequent impacts in terms of improvements to poor people's livelihoods are therefore very unclear. The programme has had and will continue to exert positive effects in developing countries, but our work in-country confirmed the huge size of the challenges facing a relatively small UK-based research programme when trying to effect change, or even demonstrate a profile, across many areas and across many developing countries. Much of the work is simply not visible and lacks the scale to attract the interest of local policymakers or of donors, whose buy-in is critical if the results are to be taken-up and applied. DFID's own inability to engage with this work through its country offices and country programmes undermines impacts.

Almost all of the projects have involved north-south collaborations and the work has benefited both sides. The pooling of competencies, sharing of experiences, and the development and transfer of research methods, tools and techniques certainly have helped to strengthen the *capabilities* of many actors both at home and abroad, in the sense that individuals participating in projects have benefited from learning. However, the programme has not explicitly sought to build-up research *capacity* – in the sense of a sustainably increased number of researchers – in developing countries and so has achieved little on this front. If beneficiary countries are to develop their own research resources over time, such deliberate capacity-building should have higher priority.

The creation of impacts has generally not been managed as a specific activity or function of the programme. Projects tend to stop after dissemination has taken place, so no-one is in a position of having **incentives** to put project results into wider practical use. EngKaR's assumption has been that idea + research + report + dissemination = impacts. However, it is a commonplace in innovation and technology transfer that end-user involvement is required at the outset in order to design the right project and connect it to forces that will ensure its effects have effects after the end of the project itself. Significant impact across multiple countries requires a critical mass of knowledge that is relevant to its target audience, and is useful, as opposed to being merely 'interesting'. The target audience also requires the means to act on the new knowledge produced by the programme, so there needs to be a connection to capacity and where necessary, funding sources. At present the programme is not clearly feeding DFID policy or DFID programmes. Equally, it appears not to be shaped by DFID priorities. Consistency among these things would provide the potential for increased impacts.

We believe that a more stable set of larger, more focused research initiatives developed around the medium-term needs of several developing countries would not only have been able to achieve greater impacts across a greater number of users but

¹⁹ Julius Court, Ingie Hovland and John Young, J, *Bridging Research and Policy in International Development: Evidence and the Change Process*. London: ITDG Publishing, 2005.

would also have helped to overcome many of the problems identified above. This then forms the basis of our recommendations for a new research programme aimed at driving sustainable improvements .

4.3 Recommendations

There is no way to know at the general level whether further funding in one EngKaR sector would more be likely to yield big, pro-poor benefits than another. We have found good results at the individual project level across multiple sectors. Our recommendations about sectoral choice in the future and about how to make choices within sectors are therefore based on more pragmatic considerations of establishing focus and exploiting the strengths that have already been built up by EngKaR. Potential future areas of research need to be defined in close interaction with beneficiaries and those stakeholders – especially DFID itself – that have the resources to connect research projects to other development process, exemplified by DFID’s country strategies. Required process improvements concern especially the way project definition is tied to user needs and resources needed for implementation. Making this link, clustering activities and building what we later call ‘knowledge platforms’ will strengthen dissemination and knowledge sharing. Existing projects’ outcomes can be strengthened by increased dissemination and by linkage to such larger ‘platforms’. We recommend a substantial change in the way DFID defines and runs EngKaR, or an equivalent public good research programme. It should therefore be monitored from the start, but not evaluated until there is enough accumulated experience to provide a substantial body of new evidence.

Improved infrastructural services can bring immediate benefits by helping poor people meet their basic needs for safe drinking water, secure shelter, energy and transport. While not mentioned in the ‘headline’ Millennium Development Goals, improved infrastructures are an absolute precondition for reaching the central goal of halved poverty by 2015. They are needed to support the economic development and growth that is the most plausible mechanism for achieving this goal. This is an area where DFID and the UK, with its rich research traditions and strong capabilities, can add value. We therefore strongly endorse the overall rationale for an Engineering Knowledge and Research programme aimed at improving poor people’s access to basic infrastructural services on a sustainable basis.

Our position is consistent with the recently published House of Commons S&T Select Committee report into the use of science in UK development policy, which urged DFID to “take into account the enabling role of engineering and technology in meeting [its] identified priorities”, and expressed concern that “technology-intensive areas such as infrastructure, energy, water and sanitation are at risk of being neglected ... due to their omission from the headline Millennium Development Goals.”

EngKaR needs to be clear about its *intervention logic*: that is, the way in which its use of resources is expected to lead to achieving development goals. EngKaR’s intervention logic has not been especially well documented in the past. In essence it is a *public good research programme*, producing knowledge that can be used for the benefit of the poor in multiple situations. Both this evaluation and a wealth of research on the innovation process show that useful knowledge is not produced by researchers working in isolation. Rather, it is created where there is a meeting

between specific needs and technological opportunity. The logic of EngKaR is therefore that it should produce knowledge outputs that are needed by, and embedded in, the specific places where the southern partners in EngKaR projects are located. This generates direct ‘first order’ effects for poor people. The knowledge should then be packaged in such a way that it can be re-used elsewhere, creating public goods for poor people in other countries and therefore ‘second order’ effects. If these second-order effects can be obtained, then the EngKaR financing has huge ‘leverage’ in improving the lives of poor people and achieving the Millennium Development Goals. The essence of our critique of EngKaR is that these second-order effects are only obtainable if the projects are defined in such a way that they tackle generic problems. In order more effectively to obtain these wider public goods, the way EngKaR defines and acquires projects needs to change.

Exhibit 16 Intervention Logic Diagram for Future EngKaR Programme

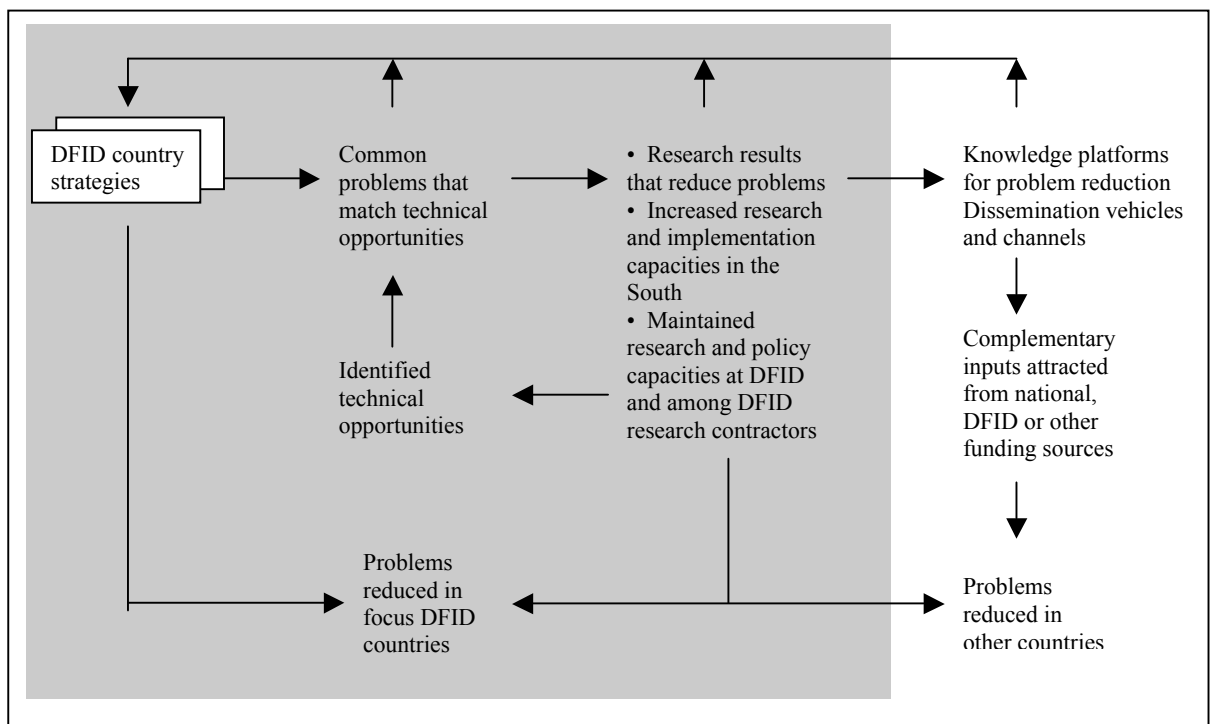


Exhibit 16 outlines the intervention logic for such an improved EngKaR. The shaded part illustrates how first-order effects should be obtained. The unshaded part relates to second order effects.

The key to achieving the desired effects is to take initial problem definition out of the hands of the research community and embed it with stakeholders at the country level. Hence, a planning process is needed that brings together developing Country stakeholders, DFID country offices, the central research function and knowledge about technical opportunities (which may well be contributed by the research community) to identify problems that appear tractable and which apply across a group of countries or which are so big that it is clearly worthwhile to invest in new knowledge in the expectation that it can be re-used in-country but outside the project. Such problems need to be ranked in terms of the potential impact of solutions, their relevance to country strategies and their technical tractability. Priority problems should be tackled via projects clustered in a small number of countries, delivered by a

contractor (or consortium) in co-operation with relevant southern partners. In this way, a critical mass of research effort is devoted to solving problems that matter in situations where actors are equipped and resourced to implement results. This will then generate first-order effects.

To achieve second order effects, the new knowledge and the implementation experience that is developed during the projects should successively be packaged into 'knowledge platforms' – in effect, allowing others to access, understand and modify the knowledge for use in other contexts. At a minimum, these platforms should comprise web-based information, but that should be backed up by access to the researchers and implementers and a programme of information to donors and beneficiary policy makers. Careful consideration needs to be given to the dissemination channels used. Multiple, parallel channels will be needed to cope with potential users' different search strategies. Some research on potential users' search strategies would be helpful. (As we earlier pointed out, this key aspect of communications strategy has not yet been tackled.) Resources will be needed to pay for the footwork involved in more proactive forms of dissemination.

Research capabilities in the north, not least those in the UK, in practice play an important part in the logic of EngKaR. A key part of the programme's value added is that it uses strong research capabilities to help build capacity elsewhere. It is therefore important to understand that the logic of untying differs between research and other forms of aid.

The classic argument for untying is that tied aid fails to develop capacities in the south, and can even increase dependence. Thus, if the UK funds the construction of a factory but insists that it be filled with UK machines and built by UK contractors, many of the learning opportunities in the south are lost and the beneficiary becomes locked into buying components and probably other inputs from the UK. In contrast, the EngKaR style of capacity-building projects aims to use and re-use northern capacities to create multiple capacities in the south that over time become independent of northern support. It follows that lack of continuity in the use of the northern capacities will make this impossible. Whether DFID itself opts to play a role in maintaining UK capacities in relevant areas or whether another funder plays this role is perhaps not all that important. However, the current situation where in effect *no one* is responsible is untenable because it has random consequences.

DFID should negotiate with other research funders in order to ensure that someone is responsible for capacity maintenance in the UK. It would probably be useful to involve not only DFID's Chief Scientist but also the government's Chief Scientific Advisor in this discussion, since few others have the standing to act as 'referee' among Departments of State.

4.3.1 Funding levels and broad divisions

EngKaR's annual commitments to new projects in recent years grew from £9.2m in 1997 to a peak of £15.9m in 2001 before falling abruptly to £7m in 2002 and £5.3m in 2003. Since then, no new projects have been funded. While our evaluation suggests a need for important changes to the way EngKaR is run, its position as a public good research fund is viable and its potential for high leverage over infrastructure problems that condemn people to poverty is very large. Not only the

British research community but also the others represented by our experts valued the programme as unusual and important. This evaluation has found that the programme has beneficial effects at the level of individual projects and that these would be increased if it were operated in the more focused way discussed here. The funding peak in 2001 indicated that the research community can deliver at least this much project activity – arguably, with increased Southern research participation and capacity building, more.

Provided the issues discussed here are addressed, a programme in infrastructure research should be relaunched in modified form, with a budget that grows as far and as quickly as possible towards the previous peak. DFID should consider subsequent growth in volume as its research budget increases and as and when the viability of the new programme is demonstrated.

We believe that future funding in these areas should seek to tackle fewer problems but in a more comprehensive and coordinated way. It should be focused squarely on issues that are known to be affecting many developing countries and where there is a clear understanding of uptake pathways and how the new knowledge generated will lead to pro-poor benefits.

DFID should therefore, reorient the funding approach to include a much greater emphasis on longer term, programmatic funding on key researchable challenges, while retaining flexibility to tackle shorter-term or newly developing challenges.

The division between the longer-term component and the other activities is inevitably a somewhat arbitrary one. The choice of areas on which to focus should be pragmatic. As we indicated, there is no evident reason to prefer one EngKaR sector over another, based on actual or potential benefits. The drivers of project success relate to needs and the ability to match these with technological and policy opportunity, as well as being able to engage stakeholders with an interest in ensuring project results continue to be used after the project itself is finished. A focus on water, transport and energy (historically, among EngKaR's three largest areas of investment) would allow the programme to build upon strength, in the form of the considerable knowledge base already created in these areas in EngKaR and elsewhere, existing institutional strengths which allow the programme and the UK to 'bring things to the party'. These areas are also relevant to the infrastructural dimension of the Millennium Development Goals.

After the terms of reference for this evaluation were set. DFID decided that research in the area of climate change should be among its priorities. Clearly, given the amount of money available and DFID's strengths and capabilities, it would not be appropriate for it to research the fundamental phenomena of climate change. Rather, its climate change resources would be well used in strengthening EngKaR sectors such as energy and transport that are among the *drivers* of climate change. In this way, EngKaR can contribute to environmentally as well as economically sustainable pro-poor development and growth.

We recommend that the programme

- **Allocate the bulk of the resource (c70%) to programme consortia on key researchable problems in water, transport and energy**
- **Keep back a small proportion of funding (20%) for researcher-led work via open calls for the EngKaR programme as a whole (managed in the standard DFID way)**
- **Have a flexible window for quick, directed policy studies (10%) that is commissioned through sector advisers at HQ or in country**

Further, we suggest that the programme be strengthened by the allocation of climate change research resources. This allocation should be reflected in the programme's assessment criteria, which should require that a corresponding proportion of projects are likely to have impacts that are environmentally sustainable with respect to climate change.

We have no indications from our work that individual EngKaR sectors are outliers in terms of the quality of projects or of their likely impacts. However, the need to cluster significant amounts of effort and eliminate the fragmentation that has hitherto characterised EngKaR implies that it should work at large scale with a small number of sectors. An appropriate instrument for this already exists in the form of Development Research Centres, so we see no grounds for complicating the implementation of a renewed infrastructure research programme by simultaneously inventing a new instrument. **There should be a large DRC (see text box below) programme on water and medium-sized programmes on transport and energy.** These – in particular the question of access to affordable services for the poor – were key problem areas identified in our field visits to India and Kenya. The programme has clearly demonstrated its usefulness in these areas, which represent both traditional EngKaR 'core business' and have close ties to the (explicit) Millennium targets on water and sanitation and the (implicit) infrastructure requirements associated with the central poverty reduction goal.

The new DRCs should adopt four important characteristics of the CPRC. First, the objectives go beyond research to policy impact and capacity building. Second, the CPRC focuses on only 4 countries (in this case Bangladesh, South Africa, Uganda and India). It also proposes to grow organically to work in other countries. Third, the Centre works to promote the findings widely in other parts of the developing world, so that it has the character of the 'knowledge platform' we discuss above. Thus, the CPRC tries to combine global analysis and influence with a few strong partnerships in developing countries aiming for national policy influence. Fourth, focusing on a small number of countries provides a way to link with both DFID HQ and with country offices.

In order to achieve the necessary linkage between EngKaR and the country offices, **a fairly senior person in the DFID office in each country where the DRCs are to be active should be given responsibility for connecting the programme to DFID's country strategy.**

DFID already funds eight Development Resource Centres (DRCs), which can be single organisations or consortia

- Centre for New and Emerging Markets
- Crisis States Programme
- Centre for the Future State
- Chronic Poverty Research Centre
- Centre of Citizenship, Participation and Accountability
- Centre on Regulation and Competition
- Centre for Research on Migration, Globalisation and Poverty
- Centre for Research on Inequality, Ethnicity and Human Security - CRISE.

For example, the Chronic Poverty Research Centre (CPRC) focuses on the chronic poor whose deprivation is sustained over many years and often carried from one generation to the next. The CPRC has articulated four interconnected objectives

- To Challenge existing ideas about poverty and enhance the understanding of policymakers and other researchers about the processes that underpin chronic poverty
- To increase the attention paid to the chronic poor in development policy and action, thus sensitising the policy community and ensuring sustained commitment to chronic poverty reduction
- To produce policy lessons and operational methodologies that make policy more effective in assisting the chronic poor
- To strengthen the capacities of researchers and research/advocacy organisations to document, analyse and develop high quality policy recommendations about chronic poverty

4.3.2 Programme Implementation

Further to improve its impacts, EngKaR needs to be clearer about whom the work is really for, who the beneficiaries are and who owns the results. As part of developing the next phase, an ex ante impact assessment exercise involving DFID staff and other key stakeholders is crucial, in order to make the link between areas of technological opportunity, need, resources and stakeholders who can ensure or enable implementation. DFID country offices and plans need to be central to this process, so that the research programme informs DFID's own use of resources. In order to concentrate resources and cluster impacts, it also needs geographical focus.

DFID should start a process of consultation and planning more closely to define the problems on which the main programmatic funding component should focus. It should identify & focus on infrastructure issues ('problems')

- **Seen as important for development – across a number of countries**
- **Where there are gaps in knowledge**
- **Where DFID could add value**
- **Oriented towards themes of relevance to policy makers**

This should be done via a consultative process involving international experts, DFID country offices as well as central staff, other donors (e.g. World Bank), and most importantly, researchers, civil society and government officials in a

selection of countries. The commissioning of research for these big programmes could then be done via an Open Call for expressions of interest and then a call for full proposals from a short list. The DRCs should take a ‘focus country’ approach, each limiting itself to 3-4 beneficiary countries in order to ensure it has enough presence to trigger impacts.

Characteristics of the DRCs should include

- Clusters of related research, training, communications and advocacy interventions aiming to influence policy and practice, each focusing in a small number of countries over a longer time frame, and creating ‘knowledge platforms’ as means to secure externalities for the wider international public good
- Longer-term programmes with clear strategies for scaling up or influencing policy (i.e. implemented by agencies with the commitment to take the ideas forward) and linked with other research and policy initiatives in target countries, with better communication of the results to organisations that might take the work forward (e.g. line ministries). Where appropriate, this should involve the private as well as the public sector
- If the programme is to have greater impact in developing countries, a greater proportion of funding should go to DC organisations
- There should be an emphasis on close engagement with users. Policy makers and other stakeholders should also be involved as necessary. One way to do this is through project advisory teams involving all relevant departments and other stakeholders
- For DFID-funded research to be more effective in developing countries there should be continuous interaction with DFID country offices to assist with implementation, lesson learning and incorporation of the results into DC government and DFID policy, practice and programmes
- The programme should be managed centrally by technically qualified DFID staff, not by contractors or consultants

In order to ensure that technological opportunities can be nurtured and selectively to enable innovation ahead of clearly articulated demand, **the researcher-led components of EngKaR should be run as before via open calls. The assessment panel should include key DFID staff as well as external experts, in order to ensure that projects are linked to DFID agendas.**

DFID itself needs strategic research capacity in the programme, in order to be able to develop evidence-based policies. **The policy studies component should be decided by DFID internally. A committee of the people responsible for EngKaR in the country offices where the DRCs are active together with DFID central research should set priorities and assess proposals.**

4.3.3 Communications and synthesis

While improvements have been made recently, communications approaches remain rather weak at the country level. There is a need for greater emphasis on communication at all levels, but it is particularly the national and local levels that need improvement. **It should be a condition of all EngKaR projects that they**

have a clear and credible communications plan, with resources allocated and specified deliverables, showing how both first- and second-order impacts are to be achieved. These deliverables should include proactive forms of communication. A publication or a web site entry is not enough.

There is a need to synthesise & add up the results of the programme and especially of the DRCs, to build the ‘technology platforms’ discussed earlier. This would need to be done in different ways at different levels.

- Within country, the key is to engage with policymakers, practitioners and end users. At the sectoral level, project holders should be doing this regularly. There may also be need for broader policy fora on infrastructure issues that involve a range of sectors. In the CPRC model, a national organization or consortium is responsible for national research, synthesis & coordination for the sector
- Across countries, the key is to promote the findings to other countries that have similar characteristics. This could be done by DFID via engaging with relevant sectoral organisations with a wider network. In the CPRC model, this is the responsibility of coordinating organisation (with DFID)
- Global public goods – there is a need to promote the findings as widely as possible to contribute to the global knowledge base. This is currently the role of CIMRC and the other EngKaR Resource Centres. It does not seem to us that both CIMRIC and the individual resource centres are required. A decision would have to be taken for each DRC and project where the best place would be to store results as a basis for dissemination. There should however also be global events that help synthesise the findings across sectors – this is best done face to face

Individual DRCs should be required to have credible strategies and plans for tackling communications at all three levels.

4.3.4 Monitoring and Evaluation

At present few projects carry out any assessment of their impacts. One of the incidental benefits of using a DRC model is that DRCs are big and long-lived enough to allow more systematic monitoring, which can then be used not only for accountability but also to help learn how to improve impacts.

- **DFID should put in place explicit monitoring arrangements for EngKaR projects and centres that generate six-monthly interaction between a DFID staff member and the project / DRC head to report and discuss progress against both budget and planned activities**
- **DFID should institute an end-of-project performance review, where achievements are compared with expectations**
- **For DRCs, post-project monitoring arrangements should be confirmed at this time, focusing on simple verifiable indicators**

DRC impacts will take time to be achieved and be complex to measure. **DFID should plan to tackle DRC impacts as part of a larger evaluation of EngKaR after 5 years.** A further evaluation should only be launched sooner than this if monitoring suggests there are serious problems.

4.3.5 Making the Transition

The suggested future shape of EngKaR is shown in **Exhibit 17**. The expenditure pattern we propose is deliberately ‘lumpy’ in order to generate the needed critical mass.

Exhibit 17 Architecture of Future EngKaR Programme

DRC Water (35%)	DRC Energy (17.5%)
	DRC Transport (17.5%)
Researcher-initiated (20%)	
Needs-driven, policy (10%)	

It is not clear at this stage how rapidly DFID can build up the EngKaR budget sufficiently to sustain three DRCs, each of which should be a multi-million pound enterprise. It may be necessary (even desirable) to launch the DRCs sequentially, depending on the budget available. For simplicity, we assume here that some budget is available for the current year and that all three can be launched in 2006.

The needed steps are

- Exploit the outputs of past projects, to extract maximum value from past investments
- Re-establish EngKaR activity through a call for proposals
- Prepare and launch a call for DRCs for 2006

As a first step, DFID should complete its EngKaR communications strategy via a study of results take-up, doing a user segmentation and improving its understanding of actual and potential users’ take-up behaviour.

In the short term, there seems to be a great need for activities for learning, synthesis and promotion across the programme – as well as to help DFID orient the next phase of work in this area. This could be done via country or regional workshops – within as well as across sectors. This would also help keep current stakeholders engaged while DFID reorients its programme.

The findings of this evaluation highlight that the projects are rather fragmented sectorally and geographically and that there has not been as great an attention to communication with policymakers or intended beneficiaries as might be hoped. This implies that much could be gained through activities to promote the findings of specific projects; synthesise the findings across sectors; and to draw together some of

the key cross-cutting findings for the programme as a whole. **DFID should give priority to such activities could be given priority while new research strategies are being put in place** – indeed the activities proposed below should provide valuable input into such programme development.

Therefore, in addition, it would be worth considering

- Making a small amount of additional funding available for communication and policy advocacy activities of existing projects that demonstrate important results and identify uptake mechanisms to exploit. Letting project holders know about this, and establishing mechanisms to ensure the resources are spent usefully.
- Making a small amount of additional funding available as seed money to take forward some of the key findings that would have an impact on policy, practice or poverty.
- Organising policy fora at the sectoral level – at country or perhaps sub-regional level – to facilitate the interaction between policy makers, practitioners and donors and EngKaR researchers.
- Organising a workshop for the programme as a whole – at regional or global level – involving researchers, policymakers and donors. The aim would be to facilitate: (i) promotion of key EngKaR research findings; (ii) learning from past experience of support for engineering research and how to link research to policy and practice; (iii) identification of key researchable problems that DFID might take forward.

The evaluation has not produced evidence that would allow us to say that some research topics ought to have higher priority than others. Conceivable evidence could have been indications of especially high or low quality or impact in parts of the programme. However, the message was that there was little wrong with individual projects. The problem was that there were too many of them and that they were disconnected from each other. With whatever budget it can make available in the short term, therefore, **DFID should launch an open call for EngKaR projects in the areas of the intended DRCs: water; energy; and transport. Assessment criteria should be as before. However, at the point of shortlisting projects for possible funding, DFID should cluster proposals by topic and geography, and buy as many related projects as possible, from the list of proposals that meet its routine quality and relevance criteria.**

DFID should announce the structure of EngKaR 2006 as early as feasible, so as to allow ample time for the preparation of DRC bids. A two-step procedure would be useful, with those succeeding at the first step qualifying to receive a limited amount of travel budget, enabling them to consult potential southern partners and stakeholders in the course of preparing their bid.

Appendix A Study Terms of Reference

Terms of Reference
IUDD Engineering Knowledge and Research Programme
Evaluation Phase II, 2004

1. Brief Description

The Central Research Department (CRD) of the Department for International Development (DFID) requires the services of a team of consultants to undertake an evaluation of its Engineering Knowledge and Research (EngKaR) Programme over the period July 2004-December 2004.

Phase II work will be an evaluation of the outputs of the six EngKaR sector programmes. The evaluation report will be submitted to the Head of Research in December 2004.

2. Background

CRD is setting up an evaluation framework for the Engineering Knowledge and Research Programme (EngKaR). EngKaR is a research for development programme divided into the six sectors of IUD: water, urban, energy, information for communication technologies (ICTs), geoscience and transport. There are two, small, newer funds for cross-sectoral research and for the development of disability technology (not included in this study) The content of the research programmes is largely derived from a competitive bidding process traditionally held over an annual cycle. Proposals are made under theme headings, which relate to knowledge gaps that have been identified within each sector. Commissioned research is also undertaken. The programme is currently funding approximately 180 projects spending £12-£14m per year.

The period of evaluation shall be completed projects in the last five years

3. Initial scoping for evaluation

An initial scoping and design study (Phase 1) for this evaluation took place in late 2001. This aimed to set the EngKaR programme within the context of the Millennium Development Goals (MDGs) – aligning EngKaR with DFID's organisational priorities and setting the framework for its evaluation at the end of the strategy period.

The evaluation should look selectively at each sector. This will probably be through selecting a selection of projects per sector depending upon the theme per sector, and where appropriate selecting a country that can serve as a case study for clusters of research outputs within a theme, sector or for EngKaR as a whole. It should look at all sectors in order to maintain the departmental overview. The evaluation methodology may vary – but should make use of the process logframe, and nested logframes where appropriate. It should address:

i) Identification

Identification of the themes and projects, and relevance particularly in terms of addressing poverty, filling knowledge gaps and contributing to the global public good. How they complement global initiatives and avoid replication of existing work and proposed work.

Methodology: mainly desk study and interviews with key stakeholders,

ii) Process

The content and quality of the processes and involvement of stakeholders.
Description of added value and benefits of DFID client assistance including feedback on reports, advice and milestone monitoring.

Methodology: interviews with researchers and stakeholders.

iii) Results

Overview of sectoral research quality, relevance to MDGs, and poverty impact.
Overview of dissemination strategies of research projects commissioned under an EngKaR theme in terms of relevance to the theme, value added to the global knowledge pool, uptake rate of products/methodologies produced and effectiveness of dissemination strategies at project level. The extent to which research proposals accepted can/have been brought together and disseminated as a “synthesis product”.
The impact of thematic and project outputs in terms of uptake and scaling up.
This should also include;

- a comparative review of the impact of localised dissemination vs widespread dissemination of generalised outputs and likelihood of success in both
- impact on government decision making, policy, specifications and impact on the poor;

Methodology: Desk study and selective consultation in the UK and overseas with Advisers, Researchers and intended users of EngKaR products (DFID in country, government policy makers, NGOs, CSOs, southern research partners, stakeholders in global partnerships etc.)

iv) Successes

“good news case studies”; in each sector, identify a successful case study, where an EngKaR product or output has been used effectively to change policies, or applied to deliver new techniques or products, and also widely disseminated and promoted. This approach, of looking at the impact first, has been adopted in the process logframe. Very often successful research applications come out of seemingly weak proposals and vice versa. Tracking this process back to the research proposal the evaluation should draw out any lessons that may be of wider relevance across sectors of EngKaR and give some indication of value added where possible;

What projects were successful in achieving their objectives, changing government procedures or impacting the poor, identify in what way projects were successful and what were the key components that were present that formed the ingredients for success.

Methodology: Interviews, correspondence (questionnaires), review of databases/ web pages, CIMRC

v) Further gains

Identify projects that were successful in completing their objectives but did not realise their full potential. What further work is needed to give maximum outcomes for the investment made? Identify translational processes where research outputs were adopted as government or institutional practice or had a scale-up effect.

The activities outlined above are indicative of the scope of the evaluation. The consultants should proactively recommend alternatives which would add value to the process or represent greater value for money for the same output.

4. Outputs

The evaluation outputs should be concise, time-limited recommendations on ways of sharing the strengths of different sectors and of identifying the weaker aspects.

Outputs from this evaluation should include:

- Evidence of effective dissemination to identified stakeholders
- Evidence of uptake by decision makers in DCs.
- Overview of the quality of research outputs for each sector.
- Evidence of relevance and value added to impact on the poor.
- Effectiveness of monitoring systems.
- Recommendations for any additional evaluation activities and process improvements that may be considered by DFID.
- Effectiveness of identification processes.

Recommendations for possible strategies for energy, water and sanitation, urban, geoscience and transport research themes for future DFID funding.

Recommendations for consideration in future areas of research.

Recommendations for consideration on dissemination/knowledge sharing activities.

Recommendations for consideration on further work to optimise outcomes of existing projects

5. Timing for Phase II evaluation activity

Phase 11 July 2004 - December 2004	
July	Start of contract
August	Inception report
October	Progress report
End November	Draft report prepared and circulated
December	Report finalised and submitted to the CRD

6. Skills and experience of the proposed team should include:

The technical nature of the EngKaR programme will require inputs from specialists in each sector. The core evaluation team will not necessarily be expected to have competence in each sector - but should be able to access such expertise as required. CRD may suggest resource persons as appropriate.

Appendix B Project Leader Questionnaire

Questionnaire for Project Leaders

Evaluation of DFID's Knowledge and Research (KaR) Programmes

This questionnaire is part of a study conducted for DFID by Technopolis Ltd., UK. Your cooperation in answering the questions is kindly requested. All individual answers and comments will be treated as strictly confidential and non-attributable.

Please use a separate questionnaire for each project in which you are involved.

Please email the completed questionnaire to james.stroyan@technopolis-group.com.

Alternatively you can fax it on +44 1273 747299 or mail it to
Technopolis Ltd, 3 Pavilion Buildings, UK - Brighton BN1 1EE.

For further information please contact James Stroyan at the above address, or by telephone on +44 1273 204320. If you wish to speak to a DFID official concerning this questionnaire please contact Peter O'Neill (Tel: 0207 023 0000; E-mail: P-ONeill@dfid.gov.uk).

Name

Organisation

Telephone number

Email address

Project title

Project reference

Project end date

1. Please indicate where the original idea for the project came from

- Self / within own organisation
- Partner organisations
- User organisations / communities
- UK government agencies (e.g. DFID / ODA)
- Other aid / development agencies (e.g. UN, World Bank, Charities)
- Other (specify)

2. To what extent did the project follow on from earlier work funded by DFID/ODA?

- Project is directly related to previous research funded by DFID/ODA
- Project is loosely related to previous research funded by DFID/ODA
- Project is not related to previous research funded by DFID/ODA
- Other (specify)

3. Which of the following techniques did you use to validate the project idea?

- Market study
- Discussions with Southern partner organisations
- Discussions with other intermediaries
- Participative project planning exercise (e.g. GOPP, ZOPP)
- Literature review
- Discussions with DFID in the UK
- Discussions with DFID in-country
- Discussions with other donors / funders
- Other (specify)

4. For each of the following categories of organisation, please indicate

- the number of organisations formally partnering in the project (excluding your own)
- the number of these that you have worked with previous to this project
- the number of organisations that are not partners but are engaged directly through the project

Organisational type	Formal partners (n)	Worked with before (n)	Not partnering but directly engaged (n)
National government ministry or agency			
Local government agency or municipality			
Non-governmental organisation			
South-owned company			
Multinational company			
Professional institutions / trade bodies			
Consultants			
University or research institutes			
Research funding body			
Other (specify)			

5. For each of the following categories of organisation, please indicate whether those involved in your project are **PRIMARILY deliverers of project outputs or the target audience for outputs. *For the purposes of this questionnaire, 'target audience' means organisations directly engaged through the project and to whom the outputs will be delivered***

Organisational type	Deliverer	Target audience	Not involved
National government ministry or agency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Local government agency or municipality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-governmental organisation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
South-owned company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Multinational company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Professional institutions / trade bodies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Consultants	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
University or research institutes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Research funding body	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Please indicate the top 3 expected (planned) benefits of your project on its target audience by placing a 1, 2 and 3 in the relevant boxes below

Target audience benefits	Rank top 3
Improved ability to develop new technology	
Improved ability to adapt new technology	
Approved ability to apply new technology	
Improved knowledge and understanding of technical issues	
Improved planning and management capabilities	
Improved policy framework for new technology	
Improved capacity to develop policy and strategy	
Improved understanding of poverty alleviation measures	
Improved access to specific technologies	
Improved understanding of specific technologies	
Other (specify)	
Other (specify)	

7. Please indicate the top 3 expected (planned) impacts of your project on its ultimate beneficiaries (poor people) by placing a 1, 2 and 3 in the relevant boxes below

End user impacts	Rank top 3
Improved financial income	
Improved employment	
Improved education	
Improved training	
Improved infrastructural services (water, sewerage, roads)	
Improved healthcare services	
Improved housing	
Improved social, cultural or political environment	
Improved environmental management	
Other (specify)	
Other (specify)	

8. For your top ranked end user impact (above), please explain briefly the process by which your project will lead to these benefits

9. How would you rate the following aspects of Programme management?

	Very good	Good	Neutral	Poor	Very poor
Application procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Contract negotiation procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Monitoring procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reporting procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Payment procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Procedures for amending project plans	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Programme communications (internal)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Programme communications (external)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. How would you rate the inputs provided by programme management?

	Very helpful	Helpful	Neutral	Unhelpful/negative	No input
Advice/assistance provided by DFID prior to submitting your application	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advice/assistance provided by DFID during contract negotiation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advice/assistance from DFID officials in UK during project implementation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advice/assistance from DFID officials in country during project implementation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advice/assistance from DFID officials in UK during exploitation phase	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advice/assistance from DFID officials in country during exploitation phase	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. Do you feel that you understand the role of the KaR Resource Centres?

Yes No

If yes, please rate the need for this role High Medium Low

Please rate the actual utility of the resource centres High Medium Low

12. Please provide below any suggestions you may have for improvements to the management of any future similar programme.

13. Please indicate below the sort of influence each of the following factors has had on project progress to date.

	Very negative	Negative	Neutral	Positive	Very positive
Competence of project partners	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Competence of DFID programme officials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Complexity of technical issues addressed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Availability of qualified personnel in the South	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Level of interest within project team in the South	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Level of interest within potential user communities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access to finance for communication activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access to DFID country offices in South	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Interest within DFID country offices in South	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Structure of the programme	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. Please indicate below the number of each of the following types of output that are / were expected to be produced directly through the project (i.e. those anticipated in your project contract with DFID). If your project is completed, please also indicate the numbers that have actually been produced.

Category of output	Numbers expected to be produced	Numbers actually produced
Standards		
Handbooks		
Written reports or other publications		
Research tools or instruments		
Prototypes		
New products developed for use in poor countries		
Existing products modified for use in poor countries		
New processes developed for use in poor countries		
Existing processes modified for use in poor countries		
Training courses for delivery in poor countries		
Technology/knowledge transfers to existing companies		
Technology/knowledge transfers via new/spin-off companies		
New policy guidelines or draft legislation		
Other (specify)		

15. If you have or are expecting to produce written reports as part of the output from your project, please indicate below the number of languages the report has/will be prepared in and the number of copies you expect to distribute in total.

Number of different languages in which reports will be produced

Number of copies of reports expected to be distributed

16. Please provide below any additional comments you may have on the programme and its operation

The following questions should be answered for completed projects only

17. Has the project generated any tangible economic benefits for participants / beneficiaries in poor countries?

Yes No

If yes, please explain the nature of these benefits and estimate the scale of the economic returns

18. To what extent have the project's objectives been achieved?

Fully Partially Not at all

If the project objectives have NOT been fully achieved, please explain reasons behind this and provide any recommendations you may have for how such problems may be avoided in the future

**THANKYOU FOR COMPLETING THIS QUESTIONNAIRE
PLEASE SAVE THE FILE AND EMAIL IT TO THE FOLLOWING ADDRESS**

james.stroyan@technopolis-group.com

B.1 Biographies of Expert Reviewers

Water - Peder Hjorth

Date of birth June 22, 1940
Citizenship Swedish
Languages Swedish, English, French, German

Relevant Education

Associate professor (docent) 1975, Lund University, Sweden
PhD 1975, Lund University, Sweden
MSc (Civil Engineering) 1966, Chalmers Univ of Technology, Gothenburg, Sweden

Main Career Stages

- Senior lecturer at the Dept. of Water Resources Engineering, Lund University (1994-)
- Associate professor at the Division of Water Resources Engineering, Asian Institute of Technology (1991-1993)
- Senior lecturer at the Dept. of Water Resources Engineering, Lund University (1984-1991)
- Associate professor at the Dept. of Water Resources Engineering, Lund University (1977-1984)
- Visiting scholar at Stanford University, August-December 1982
- Executive Secretary (pro tempore 50%) at the Swedish Committee for the International Hydrological Programme, September 1976-May 1977
- Research associate at the Dept. of Water Resources Engineering, Lund University, (1974-1977)
- Graduate student and Teaching Assistant at the Dept. of Water Resources Engineering, Lund University
- Guest researcher at Institut de Mécanique, Grenoble France (October 1972-June 1973)

Main research interest and experience

- Main research interest and experience in water resources management in as well industrialised as developing countries. Application of systems thinking and holistic approaches to issues about sustainable development. Research on the implementation of local Agenda 21 in Sweden. Research on the urban environment, especially studies on integrated management of water supply, sanitation, drainage, and solid waste in urban settings.
- Experience in writing and evaluating research proposals and projects, organizing and managing various research and teaching related activities (courses, symposia, etc), working in team, and leading groups up to ten people.
- Experience in international co-operation (RTD, education, and training), eg EU, IIASA, IAHR, IAHS.

National and international activities

- Contracted by the World Commission on Dams to write a thematic review on operation, monitoring, and de-commissioning of large dams.
- Member of an international team writing on sustainable development and management of reservoirs.
- Contracted by EU as PTA for FP5-projects on regional water management in the Mediterranean region.
- Research on the implementation of Agenda 21 principles within water supply, sanitation, and solid waste management, sponsored by the Swedish Waterworks Association.
- Consultant to the Swedish Highway Administration on artificial wetlands.
- Team leader for the first interdisciplinary Swedish study on water resources planning.
- Team leader for a study on sustainable urban development.
- Team leader for an evaluation of a decade of Sida efforts to promote water supply in Kenya.
- Chairman of the IAHR Technical Section on Water Resources Management (1989-1995).
- Member of the Consultative Group of the Global Water Partnership (1997-2001).
- Member of the Water Supply and Sanitation Collaborative Council (WSSCC).

Other scientific and educational activities

- Extensive experience of course development and lecturing for as well undergraduate students as graduate students.
- Course Director of the international post experience training programme on “Water Resources Management in developing countries.
- Co-organiser (with UN-ESCAP) of a National Vietnamese Workshop on Urban Water Management.
- Organiser of an international workshop on “Ecological Approaches to Urban Systems”.
- Organiser of national Swedish workshops; three IHP workshops and one FRN workshop.

Geoscience – David Knopf

RESUME **DAVID J. KNOPE, DR. SC., GEOLOGIST**

EXPERIENCE **International (Africa/Europe/North America) economic geology, environment**

since 1982 **Consultant** : precious/base metals and diamond exploration and evaluation in Czech Republic, Austria, Italy, Switzerland, France, Spain, Portugal, Algeria, Morocco, Senegal, Mali, Guinea, Ivory Coast, Burkina Faso, Togo, Ghana, Niger, Chad, Central African Republic, Cameroon, Burundi, Mozambique.

1974 to 1981 **Employed by Alusuisse Mining Ltd (ALUMINING), based in Zurich, Switzerland**

1977 to 1981 Vice-president of Swiss Aluminium Mining Co of Canada Ltd (SAMCAN) : purchase, prospecting as operator, farm-out and sale of uranium and Cu/Co properties in Saskatchewan and British Columbia.
Manager, technical assistance projects negotiation in Burkina Faso (diamond) Central African Republic (diamond and gold), Syria and Jordan (phosphates) Libya (uranium), Sierra Leone (gold), Gabon.

1975 to 1977 Assistant for negotiations and management of technical assistance projects in Egypt (phosphates), Algeria (iron), Guinea (bauxite). Coordinator of activities in Central African Republic : Bakouma uranium project, diamond exploration.

1974 to 1977 Senior geologist in charge of the evaluation of mineral prospects worldwide : USA (uranium), France (lead/zinc), Spain (tin), Portugal (tin/tungsten), Sudan (natron), Mali (bauxite), Niger (uranium), Ivory Coast (nickel), Saudi Arabia, Oman and the United Arab Emirates (various minerals).

1971 to 1973 **Employed by Dr. G. Wiener, consulting geologist, Liestal, Switzerland**
Hydrogeology, engineering and environmental geology in Switzerland. Consultant to a diamond and kimberlite exploration project in Ivory Coast.

1970 to 1971 **Employed in Angola by Diamond Distributors Inc., New York and Paris**
Senior geologist in charge of two alluvial diamond prospecting teams.

1969 to 1970 **Research geologist, University of Lausanne, Switzerland**
Doctorate thesis on kimberlites and diamonds in Ivory Coast and West Africa.

1963 to 1969 **Employed by the state mining corporation SODEMI, Abidjan, Ivory Coast**
Chief geologist in charge of diamond geology and exploration in the whole country. Management of exploration programs in the field. Study of the geology and geomorphology of placer and hardrock diamond deposits.
Field geologist : economic potential assessment of iron formations (BIF) and mafic and ultramafic rocks in W Ivory Coast. Visit to Liberia and Sierra Leone.

CIVIL STATUS Born on 20 November 1937 - Swiss Citizen - Married, two children.

EDUCATION Graduate geologist (M.Sc.) in 1962 and Doctor in Sciences (Ph.D.) in 1970, both at the University of Lausanne, Lausanne, Switzerland.

LANGUAGES Fluent in French (mother tongue), English and German. Working knowledge of Portuguese. Spanish and Italian read and understood.

Transport – Henning Lauridsen

Firm: Institute of Transport Economics (TØI), Norway
Position: Chief Research Officer, MSc. Eng.
Date of Birth: 1941
Years with TOI: 35 years Nationality: Danish
Membership in Professional Societies: Norwegian Society of Chartered Engineers (NIF) - Associated Group on International Development (Former Chairman), Norwegian Polytechnic Society Transportation Group and Danish Association of Professional Engineers (IDA)

Education:

1969-70: Postgraduate planner education, Nordic Institute of Urban and Regional Planning, Stockholm, Sweden.
1965: M.Sc., Civil Engineering (Main subject: Transportation) Technical University of Denmark

Employment Record (1985 onwards):

1999 - Chief Research Officer. Institute of Transport Economics, Oslo, Norway
1996-98: Deputy Team Leader and Transport Economist of the Southern Africa Transport and Communications Commission (SATCC) Transport and Communications Integration Study for Southern Africa. Kampsax International, Copenhagen, Denmark (duty station: Maputo, Mozambique). Client: SATCC/European Union
1989-96 Head of Department for Transport Analyses and Regional Development. Institute of Transport Economics, Oslo, Norway
1985-89: Head of Department for International Co-operation. Institute of Transport Economics, Oslo, Norway

Mr. Lauridsen has more than 30 years experience as transport economist, transport engineer and transport planner. He has substantial managerial experience as head of various departments at the Institute of Transport Economics. Mr. Lauridsen has extensive overseas working experience in particular from Eastern and Southern Africa but also from Asia, in particular China. He has been project manager/team leader for a number of projects in Southern Africa from 1979 until today and has professional experience from most transport sub-sectors, among them road infrastructure, road transport, road safety, rural transport, railways, ports, coastal shipping and civil aviation. He has worked extensively with transport planning and evaluation of transport sector programmes and projects.

Overseas experience has been characterised by a close working relationship with the Southern African Development Community's transport commission SATCC. Mr. Lauridsen was Chief Transport Economist of the SATCC Technical Unit during the first years of the organisation (1982-84) and has since then carried out a large number of assignments for the unit. During a 10 years period, he was project manager for a major technical assistance project for the SATCC. The project comprised support to the SATCC Technical Unit and, in particular, secretariat services for a regional group of officials on road traffic and road transport established by SATCC to harmonise laws, regulations and procedures within the region and numerous road sector activities were carried out in this respect. This included preparation of a programme for axle load control and a road safety project description for Malawi.

Mr Lauridsen has during the last three years been team leader for two road sector reviews in Tanzania and for a road sector review and an axle load control programme appraisal in Zambia. He has also been team member of a World Bank road sector review in Zambia and participates currently in a road re-classification study in Mozambique. Parallel to this, he has worked with transport policy and planning in Europe and has participated in a number of ex post evaluation studies in Scandinavia. Further, he has participated in a EU research task force on transport planning and evaluation methodologies (TRANS-TALK) and been team leader for a pilot project on transport, welfare and economic development in South-Eastern Europe.

Energy – Dr Amitav Rath

Dr Amitav Rath is currently the Director of Policy Research International in Canada. He has over fifteen years experience in the design, management and evaluation of large and complex development projects. He has a Ph.D. from Berkeley, California, is trained in both management and economics, and has worked extensively in the areas of economics, technology, energy and environment policy. He has worked in training, research and policy making institutions and in the private sector, in India, Jamaica, Canada and the United States. As a manager of the programs on Energy Policy, Science and Technology Policy and Institutional Development he has designed, developed and managed over one hundred projects and has conducted research and policy analysis in most countries in Asia, Africa and Latin America. As the Director of PRI he provides valuable input in the areas of management and systems expertise, experience of policy, research and analysis in economics, energy, environment and social policy issues in all projects. He has worked as a consultant for several UN agencies, the World Bank, OECD, CIDA, IDRC and the Commonwealth Secretariat. He has recently completed work on energy technology needs in four countries and has been selected on standing offers on education and environment policy. Languages: English, Hindi, and Bengali; French, and Spanish (reading only)

Urbanisation – Forbes Davidson

Born	1946
Nationality	British
Education	B.Sc. (Honours), Geography (1963 - 1968), University of Glasgow, Glasgow, Scotland Post-graduate Diploma in Town and Country Planning (1969 - 1971), University of Newcastle upon Tyne, Newcastle, England
Professional Affiliations	Member of the Royal Town Planning Institute, United Kingdom
Languages	English, French, Arabic (basic), Indonesian (basic)

Professional Experience (selected)

1984 - Staff member Institute for Housing and Urban Development Studies, Rotterdam, The Netherlands. Responsible for training and education programmes especially on urban management and participatory planning,

Forbes Davidson has twenty-nine years of experience in urban and regional planning, urban management, land management institution building, institutional assessment, low income housing, capacity building, training, project review and evaluation and project management. In UK he worked in planning teams in local government and New Town Development agencies. More than twelve years was spent in developing countries, including a long-term involvement in Ismailia, Egypt. In Ismailia, he worked on a wide range of urban development issues, from preparation of development plans for the city through project implementation to development of new urban management and land development institutions. He led a team of experts in preparing detailed project plans, and a technical assistance team that established, trained and supported local development agencies for city-level planning and project design, implementation and management. The projects involved close working between local government, community and the private sector.

In Indonesia, he was leader of the IHS team, which helped establish a training programme to support the Integrated Urban Infrastructure Development Programme (IUIDP). This programme had the objective of developing local government capacity for decentralised planning and management of infrastructure. Mr Davidson also developed a special training programme for private sector participation. In India he has provided specialised support for the Human Settlements Management Institute to develop decentralised training programmes, particularly in the field of action and strategic planning for urban management.

Mr Davidson has provided specialist support for UNCHS, reviewing the experience of the community participation-training programme in Zambia, a policy paper on the relationship between working government and non-governmental organisations and relocation and resettlement. He has worked with GTZ in South Africa has focused on the support of participative planning processes for small and medium towns in the Eastern Cape and on developing capacity for integrated planning in the Eastern Cape – Free State. A special workshop was developed together with Department of Constitutional Development and local Government Training Board on Capacity Building for urban management for staff of 9 provinces in South Africa.

In Rotterdam, Forbes Davidson developed and runs the workshop in Urban Management and Planning including Land Management, and planning modules for the Masters Programmes in urban management and urban environmental management. He led the team preparing capacity building strategy papers and seminars for Habitat II in Istanbul.

In addition, Mr Davidson has worked in Cairo and Giza (Egypt), Gambia, Libya, Zambia, Nepal, India, Tanzania, Poland, Romania and Vietnam