

**Evaluation of the DTI New and Renewable Energy
Programme
1994-8
FINAL REPORT**

by

**The Energy Programme
SPRU, Science and Technology Policy Research
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EXECUTIVE SUMMARY

This independent evaluation of the DTI New and Renewable Energy Programme was conducted by SPRU, University of Sussex.

The main objectives of the evaluation were to establish to what extent the rationale for the programme, set out in a rationale, objectives, appraisal, monitoring and evaluation (ROAME) statement, can still be supported; to what extent the objectives are being achieved; and whether the programme has given value for money.

The evaluation covered programme expenditure between financial years 1994/95 and 1997/98 inclusive, a total of £62.3 million, though 1993/94 figures were often used for comparative purposes. Expenditures under the Non-Fossil Fuel Obligation (NFFO) and the 'task force' role of the DTI itself, set out in Energy Paper 62, were excluded from the evaluation. This caused some analytical difficulties, not least because the ROAME objectives, developed in 1993, encompassed not only the Support Programme evaluated here, but also the wider strategy set out in Energy Paper 62, including both the NFFO and the DTI task force role.

The Programme also underwent a number of significant changes during the period evaluated, including substantially reduced funding (and related policy adjustments) compared to that envisaged in 1993, and privatisation of ETSU, the DTI's programme manager, in 1996. These are discussed briefly below.

The main conclusions of the review are as follows:

Validity of Rationale

The basic rationale underpinning the programme was that there were a number of market imperfections which acted in favour of established technologies and against new and renewable technologies, and that this justified intervention in favour of helping renewable energy to become established. Six separate market imperfections were listed in the ROAME statement, without any evident priorities. The primary imperfection however (and the first mentioned) was the presence of environmental externalities which artificially reduce the market price of conventional energy sources. Most of the other valid market failures which are listed in the rationale such as of lack of information and awareness, administrative and legislative barriers, appear to be mainly a consequence of the primary market imperfection.

The rationale for the Programme continues to be valid, but developments over the last few years suggest that in the future even more weight might reasonably be put on the environmental externality argument, even though precise quantification of the size of these externalities is difficult and not yet fully established. The risks of *not* developing

renewables in plausible climate change policy scenarios are quite uncertain and potentially quite large.

Achievement of Objectives

Aims and objectives of the Programme were detailed, and mixed together with objectives for the wider, integrated programme including the NFFO. The Support Programme has nevertheless made significant progress towards achieving its objectives and made a substantial contribution to delivering the Government's broader objectives in this area. There was a widespread belief that there had been much additionality achieved and virtually no displacement of private sector activity.

There is strong support amongst the new and renewable energy community for continuing the programme with broadly similar aims. Inevitably, however, the declining budget has had an impact, and not all the original aspirations have been delivered, especially in the area of technology development. The original ROAME objectives however were wider than those strictly achievable by the programme alone and extremely detailed.

For the future there is much to be said for prioritising and simplifying the statement of aims and objectives, despite the attractions of setting out detailed and quantified targets as a basis for assessment. Inherent uncertainties in a Programme of this sort make such precision often inappropriate.

Value for Money

Many of the original Programme objectives have been fulfilled despite the large and originally unplanned reduction in financial provision. That the programme has fulfilled its objectives to the extent that it has, given these financial cuts, has shown ingenuity and flexibility. However, the percentage of the total programme provision spent on 'central' costs, although understandable, has been high in recent years. The various management tasks undertaken by ETSU should be split between different companies in future and be subject to competitive tender. This action would also help reduce the perception among some Programme participants of ETSU's dominance in the Programme, now inappropriate in a private sector context because of the competitive relationship between ETSU and some Programme participants. Overall, it is difficult to judge whether or not the Programme has provided good value for money, mainly because it has proved impossible (not uncommon in evaluations over a short time period of an RD&D based programme) to get an across-the-board quantified view of Programme benefits.

The evaluation was required to assess a number of other issues. These were all addressed and the key findings were:

- that in future the objectives of any supporting programme of RDD&D and technology transfer should be more clearly delineated from the objectives of other

parts of the Government's overall N&RE programme such as the NFFO and administrative action;

- that the programme has added value to the NFFO in terms of success of deployment though whether at lower cost has been difficult to discover.

Other issues which attracted significant comment, outside those which the evaluators were asked to assess in particular, were related to a need for more activity in planning guidance, more dissemination of information to the general public, and more formal industrial input into the programme.

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1 INTRODUCTION

The Energy Policy and Analysis (EPA) Unit of the Department of Trade and Industry (DTI) in conjunction with the DTI's Energy Technology Directorate (ENT) asked the Energy Programme of SPRU (Science and Technology Policy Research), University of Sussex, to undertake an evaluation of the DTI's New and Renewable Energy (N&RE) Programme over the 1994-1998 period. The evaluation took place during in the latter part of 1998 and early 1999.

2 BACKGROUND

a The early Support Programme

Since the mid 1970's the Government, through the DTI and formerly through the Department of Energy, has supported programmes of research, development and demonstration (RD&D) related to renewable energy in collaboration with the UK industry. During the lifetimes of these programmes, progress has been reviewed at regular intervals, and each technology addressed has been assessed for its potential contribution to UK energy supplies, its likely economic attractiveness, and in relation to any remaining uncertainties. This has enabled new aims and objectives to be set, judgements to be made about the choice of technologies to support further, and about the level of resources appropriate for each subsequent phase of work.

b The NFFO

Up to the late 1980s, a variety of factors meant that there had been no commercial implementation of renewable energy technology in England and Wales. However, in 1990 a new market support mechanism was introduced for non-fossil-based electricity supply, the Non-Fossil Fuel Obligation (NFFO), supported by the Fossil Fuel Levy (FFL). Initially, the NFFO supported both the long-established technology of nuclear power as well as renewable electricity. The rest of this discussion is confined to the renewables part of the NFFO.

In 1990, the first (of five) Non-Fossil Fuel Obligation (NFFO) Renewables Order was laid under the provisions of the 1989 Electricity Act. The NFFO provides contracts to electricity generators at a premium price per unit of electricity. An obligation was placed on the RECs to purchase the electricity at a market price, based on the England and Wales electricity Pool (spot) price. The difference between the market and premium price was paid for by the Fossil Fuel Levy on retail electricity bills.

As Table 1 below shows, a substantial volume of renewable energy, over 3250 MW, has been contracted under the five NFFO orders, and to date some 528 MW is producing electricity. The NFFO has been increasingly heavily over-subscribed, and its key success has been in reducing the price of renewable electricity from some 7p/kWh in the first two

Orders to only 2.71p/kWh in the 5th Order. This price can be compared to the average spot price for all electricity of around 2.5p/kWh in 1998, and an average purchase price paid by RECs over the last two years of 3.5p/kWh. The NFFO1 and NFFO2 contracts have now ended, and most of the projects in them have successfully

Table 1 Renewable Energy in the NFFOs

	Capacity awarded (MW DNC)	Capacity deployed (MW DNC)	Average price (p/kWh)
NFFO 1	152	145	7.0
NFFO 2	472	174	7.2
NFFO 3	627	191	4.35
NFFO 4	843	18	3.46
NFFO 5	1177	0	2.71

Note: MW DNC = declared net capacity in megawatts

transferred to the open electricity market. The technologies in the NFFO which have been most successful have been wind energy, landfill gas and waste to energy technologies. All three of these had significant support from the Support Programme before the NFFO started, and continued to be supported subsequently. It is beyond the scope of this evaluation to analyse either the NFFO or the Support Programme in years before 1994, but it seems clear that there were some direct connections between the Support Programme and the quasi-commercial establishment of technologies in the NFFO. Analysis of links between the Programme and the NFFO after 1994 is contained in Section 5f below.

c The Support Programme in the 1990s

Following internal reviews and a major external evaluation by the Renewable Energy Advisory Committee (REAC), published as Energy Paper 60 in 1992, a new policy, strategy and programme were developed. This reflected the need to widen the focus of renewables policy to encompass the new NFFO programme in addition to the well-established RD&D support programme. A new 'integrated programme' consisting of the RD&D support programme, the NFFO and a DTI 'Task Force' was envisaged. An internal statement of rationale, objectives, appraisal, monitoring and evaluation (ROAME), covering the integrated programme as a whole, was developed and approved in the summer in 1993. A slightly altered form of this was published in the 1994 Energy Paper 62, which also took account of other reviews, including the Energy Select Committee Fourth Report on Renewable Energy and the National Audit Office Report on the Renewable Energy Programme.

While the programme proposals were being developed, the Department of Energy was disbanded by the incoming Government after the General Election in spring 1992.

Responsibility for new and renewable energy policy and programmes was transferred to the DTI. The programme subsequently announced in 1994, through publication of Energy Paper 62, was therefore brought within the different programme management and evaluation arrangements of the DTI.

Following the change of Government in May 1997, a further review of renewable energy policy has been undertaken and a consultation paper has recently been published.¹ The previous Government had set a target of 1500 MW of renewable capacity by 2000. The new review has examined, amongst other things, what would be necessary and practicable to achieve a more ambitious target of a 10% contribution towards the UK's electricity needs from renewables, including further research, development, demonstration and dissemination (RDD&D).

Under the ten year strategy published in Energy Paper 62, each technology was classified under one of three categories:

- market enablement;
- assessment; and
- watching brief.

Renewable electricity generating technologies within the first of these categories (closest to commercial competitiveness) were to benefit from an initial protected market subsidised via the NFFO. There were in addition a wide range of complementary activities including a continuation of the supporting RDD&D programme, which would not only support further technical research and development to reduce costs and improve performance, but also address other issues. These included planning, finance, environmental impact, grid integration, business and market development, education and training, and public information and awareness. It would also provide the resources for assessing NFFO project proposals and monitoring the progress of contracted NFFO projects.

'Assessment' technologies with prospects for the longer term were also to be supported by the RDD&D programme so that they could be further developed, and their potential clarified with a view to market enablement support at a later date if appropriate. Those technologies judged as unlikely to contribute significantly to UK energy supplies by 2025 would not receive further financial support but would be the subject of a watching brief within the support programme. It is this support programme (referred to here as the DTI New and Renewable Support Programme, or Support Programme for short) that is the subject of this evaluation.

Other complementary activities envisaged in Energy Paper 62 included administrative action to address legislative and administrative barriers such as the issue of planning guidance to local planning authorities. ETSU, formerly part of the UK Atomic Energy Authority and now an operating unit of AEA Technology plc, privatised in 1996, has provided management, technology transfer, strategy and evaluation and other services for the Support Programme since its inception in the 1970s. The public sector

¹ DTI *New and Renewable Energy: Prospects for the 21st Century* London, HMSO, March 1999.

arrangements under which it performed these tasks were replaced by contractual arrangements appropriate to its status in the private sector in the run up to AEA Technology's privatisation in 1996.

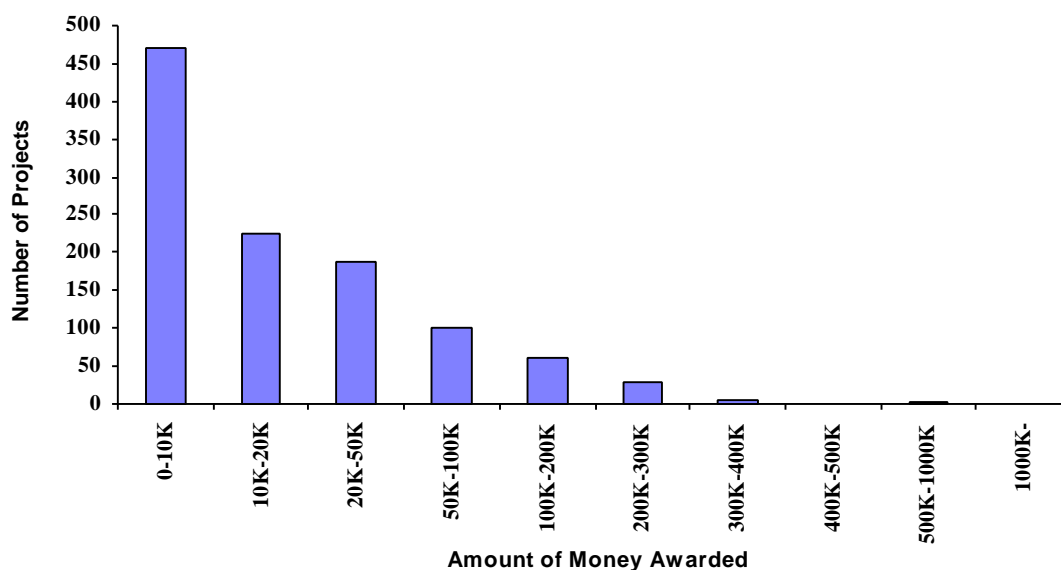
d A profile of the Support Programme

There are a number of distinctive features both of the Support Programme and of the renewable energy industry to which it relates, several of which have important consequences for the methodological approach taken to this evaluation:

- Before the Support Programme was set up in the mid-1970s, there was virtually no renewable energy industry in the UK. To a substantial extent (and certainly before the NFFO), the industry was set up and developed largely as a consequence of the financial and technical assistance it received from the Support Programme;
- The renewable energy industry in the UK is fairly sharply distinguished from related industries and currently consists of some 600 organisations, most of them SMEs or university and other research groups;
- Because the industry consists mainly of small companies of recent origin plus universities, the Support Programme has not usually used formal mechanisms to require counterpart or matching funding from recipients of grants, except in a few cases;
- The Programme has always been closely directed in terms of technology choice decisions, and has also tended to distribute its financial support very widely.

Chart 1 illustrates the fact that money has generally been provided in small quantities to a large number of recipients. In the 5 years to 1998, almost 1500 separate awards were

Chart 1. Distribution of Programme Awards for each Project (1993/94-1997/98)



made, of which over 450 were for amounts below £10,000. A negligible number of grants was made to an individual value of over £300,000, and the average value of awards varied annually in the range £24,000 to £37,000, with no clear trend over the four years of the evaluation period. Over five years to 1997/98, just over 500 separate organisations have received financial support. In terms of the types of recipients, the overwhelming majority of the almost 1500 awards were made to UK-based companies (80%), followed by universities (9%), trade associations (2.5%), national laboratories/research councils (2.5%), national Government agencies (1.8%), with local Government and NGOs each obtaining around 1%.

The expenditure profile of the programme forecast at the time of the original ROAME statement in 1993 showed total expenditure being maintained (in 1992 prices) at £22 million to £24 million per annum to 2000/01, then declining to £13.2 million by 2004/05. In practice, expenditure has been much lower due to decisions in the 1994/5 and subsequent public expenditure rounds. Programme expenditure over the period 1993/94 to 1997/98 is shown in Table 2 below.

Table 2 Actual Expenditure 1993/4-1998/9 (£ million),
(exception 1998-99, where provisions shown).

Expenditure	1993-4	1994-5	1995-6	1996-7	1997-8	1998-9
ETSU	7.2	7.1	6.0	4.5	4.3	
External	18.0	12.0	12.2	9.4	6.8	
Total	25.2	19.1	18.2	13.9	11.1	
Recoverable VAT				2.4	1.9	
Gross Expenditure				16.3	13.0	13.1*
Receipts VAT and A in A				1.5	2.1	2.0*
Net Expenditure				14.8	10.9	11.1*

Notes: (1) Before 1996/97 the majority of Programme spend did not attract VAT and appropriations were not recorded at the programme level. The programme expenditure shown for 1993/4 - 1995/6 was broadly equivalent to both net and gross expenditure.

(2) * Provision

(3) A in A means Appropriations in Aid

Provision was expected to fall again to £9.2 million in 1998/99 and to £7.6 million (net) thereafter, but in early 1998, pending the outcome of the current policy review, the 1998/99 provision was set at £11.1 million (net).

The expenditure decisions reflected above, and other Ministerial policy decisions since 1993/94, have had a significant impact on the shape and content of the support programme. This led to an increasing divergence between the programme proposed in

the ROAME statement of 1993 (and that described in Energy Paper 62) and the programme actually implemented each year. Partly to reflect these changes, modified objectives were published in a partial revision to the ROAME statement in 1994/95.

Key changes between 1993, the date of the original ROAME statement, and 1997/98, have included;

- conclusion of the wave, photoconversion, landfill gas and waste to energy support programmes;
- virtual ending of support for education, training and public information;
- virtual ending of support for market enablement projects (excluding NFFO) under the wind programme
- severe reductions in watching brief activities, although offshore wind has now been included in the market enablement and assessment area for the first time;
- a new export promotion programme was initiated in 1994.

Table 3 Programme Expenditure by Major Activity 1993/4-1997/8 (£ million)

EXPENDITURE	1993/4	1994/5	1995/6	1996/7	1997/8
EXTERNAL					
Biomass	n/a	n/a	2.4	2.0	1.3
Energy from Waste	n/a	n/a	1.1	0.6	0.1
Biofuels (Biomass and Wastes)	3.4	3.6	3.5	2.6	1.4
Fuel Cells	0.8	0.9	1.2	0.9	0.9
Solar	2.4	2.1	1.9	2.0	1.7
Wind	7.3	2.7	3.4	2.4	1.2
Water Power*	0.9	0.5	0.3	0.2	0.1
Commercialisation	0.5	0.9	0.9	0.7	0.6
Geothermal HDR	1.1	0.2	-	-	-
Marketing Co-ordination**	1.5	1.1	0.5	0.1	0.3
Competitiveness and Exports***	-	-	0.3	0.4	0.5
International Liaison	-	-	0.1	0.1	0.1
Strategy and Evaluation	0.1	-	0.1	0.1	-
ETSU****	7.2	7.1	6.0	4.5	4.3
TOTAL	25.2	19.1	18.2	13.9	11.1

Notes: (1) All figures rounded to £0.1 million

(2) Before 1996/97 the majority of Programme spend did not attract VAT and appropriations were not recorded at the programme level. The programme expenditure shown for 1993/4 to 1995/6 was broadly equivalent to both net and gross expenditure. Expenditure in 1996/97 and 1997/98 excludes VAT.

(3) * Water power includes wave and tidal expenditure as shown below: Wave: 1993/94 (0.2m), 1994/95(0.1m),1995/96(0.04m) and 1996/97 (0.05m); Tidal: 1993/94 (0.6m), 1994/95(0.2m), 1995/96(0.2m).

(4) ** From 1995/96 technology specific marketing costs included separately under each programme and amounted to an additional 0.5m, 0.2m, 0.2m in 1995/96, 1996/97 and 1997/98 respectively.

(5) *** Some expenditure on Competitiveness and Exports in marketing in 1993/94 and 1994/95.

(6) **** ETSU costs include programme management and administration, contracts and finance support, technology transfer and technology evaluation.

Most of these changes can be tracked in Table 3 above, which shows programme expenditure by activity since 1994/5. A more detailed breakdown of programme expenditure in 1997/8 (£ million) is shown in Table 4 below.

Table 4 Programme Expenditure 1997/8 (£ million)

Programme Area	External	ETSU	Total
Biomass	1.36	0.54	1.9
Fuel Cells	0.91	0.27	1.18
Solar	1.67	0.26	1.93
Energy from Waste	0.13	0.15	0.28
Water Power	0.07	0.12	0.19
Wind	1.25	0.36	1.61
Commercialisation	0.61	0.52	1.13
Competitiveness and Exports	0.47	0.35	0.82
International Liaison	0.09	0.21	0.30
Strategy and Evaluation	0	0.34	0.34
Marketing Co-ordination	0.27	0.28	0.55
Programme Administration	n/a	0.85	0.85
TOTAL	6.83	4.25	11.1
		Recoverable VAT	1.9
		GROSS Expenditure	13.0
		Receipts (VAT and A in A)	2.1
		NET Expenditure	10.9

Note: (1) External spend includes technology specific marketing costs under each programme area.
(2) A in A means Appropriations in Aid

3 TERMS OF REFERENCE

In accordance with standard DTI practice, the DTI initiated an independent external evaluation of the Support Programme in the Spring of 1998. This evaluation, which specifically excludes consideration of the NFFO (although it does look at the inter-relationship between the programme and NFFO), is intended to feed into the design and implementation of any continuing support programme following the policy review.

The purpose of the evaluation was to establish;

- to what extent the rationale for N&RE programme can still be supported;
- to what extent the relevant ROAME objectives are being achieved; and

- whether the programme has given value for money.

In more detail, the specific issues which the evaluators were asked to address were:

- the extent to which the rationale continues to be valid;
- the extent to which the programme has met the overall, and more detailed, ROAME objectives;
- the scope for alternative, more measurable ROAME objectives;
- the quantification of benefits arising from the programme (including consideration of additionality and displacement);
- whether the programme has added value to, or reduced the cost of, the NFFO;
- the complementarity or links to other programmes, such as European Commission programmes and the benefits which arise from those links;
- the overall effectiveness of the programme management; and
- the overall value for money of the programme.

The original 1993 ROAME rationale of the N&RE programme is provided in **Appendix 1**; the original 1993 objectives are provided in **Appendix 2**; the original 1993 detailed objectives are found in **Appendix 3**; and the revised 1994/95 objectives are found in **Appendix 4**.

4 METHODOLOGY

The main elements of the evaluation comprised:

- a review of the programme records and monitoring information held by ETSU;
- a postal questionnaire to 129 programme participants;
- over 20 interviews with programme participants and interested parties such as the European Commission;
- three case studies which comprised in-depth reviews of three programme areas: commercialisation; wind energy; and biomass; and
- analysis and review.

The postal questionnaire was sent to 129 individuals and organisations selected from a number of sources.² The crucial point about the choice of the recipients was that as far as possible they were equally divided between those who had received money from the programme and those who were ‘users’ of the programme, ie those who were involved to some extent but had not received programme money as a result of a contract. The recipients of programme funding included not just potential or actual equipment manufacturers but also project developers, consultants, local authorities, electricity companies, universities, other educational organisations and trade associations.

² These were: the ETSU list of those who/which have had a contract with ETSU since 1992; the James and James publication list of 600 renewable energy industry participants; and requests to the UK renewable energy technology lobby associations for recommended participants.

While the division of questionnaires was roughly equal between recipients and non-recipients of money from the Programme, finding an equal number of relevant non-recipients of financial support proved much more difficult than finding recipients. This was because nearly all members of the renewable energy community have received money from the Programme (as pointed out above, 500 organisations have received money since 1993/94, and the industry consists of some 600 organisations).

The questionnaire results are provided in **Appendix 5**. Of the 129 questionnaires sent out: 62 (48%) were returned and filled in (to differing degrees), although another 8 were returned but unusable.³ Responses were analysed in a number of ways such as excluding those who indicated that a question did not apply to them, or excluding those who answered 'don't know'. A possible problem arose from the fact that the usable responses were much more heavily concentrated among recipients of money than non-recipients. In fact, of the 62 responses, only 14 came from those who had not received financial benefit from the Programme. Generally it might be expected that those who receive money from the Programme will have an inherent bias towards regarding the Programme as desirable, for reasons of financial self-interest.

This raises the suspicion that the questionnaire answers will be biased systematically towards an over-favourable view of the Programme. However three points may be made:

- an analysis has been made of the differences in answer between those who did and those who did not receive money from the Programme. This shows no evidence of systematic difference in responses. It is true that because of the small number of questionnaire respondents that were not recipients of Programme money, large differences in answer would be needed to be statistically significant: nevertheless, none have shown;
- because a majority of those questionnaire respondents who had received money from the Programme had received only small sums of money, and from limited parts of the overall Programme, it is unlikely that any resulting and favourable biases in their answers would spread systematically to answers in areas remote from their own interests. It is therefore unlikely that most respondents would exhibit favourable bias across the board in their answers;
- because the renewable energy community is small, and the great majority of its members have received Support programme money, it is inherently difficult to find a large or significant 'user' community that has never had any financial benefit from the Programme. This is an unavoidable problem in any attempt to guarantee a relatively objective response to the Programme, and not easily overcome by any particular methodological device.

The questionnaire comprised a total of 45 questions, organised in seven sections. These were as follows:

- Section 1 sought information about the respondent, their involvement in the programme, and about overall benefits, additionality and displacement. Questions in

³ Appendix 5 describes some general statistical questions of validity in relation to questionnaire replies.

this section were further segmented into two groups: those addressed to programme contractors (whether fully funded consultants, or grant-aided via a shared cost contract); and those addressed to individuals or organisations ('users') which had not been directly funded but had obtained programme publications, attended an event or sought advice from ETSU;

- Section 2 asked questions about the encouragement for the uptake of technologies which are approaching competitiveness (corresponding to the first major ROAME aim);
- Section 3 asked about the stimulation, in collaboration with industry, of the development of technologies likely to become competitive in the short to medium term (corresponding to ROAME aim 2); it also asked about assessing, and maintaining, for technologies which have prospects for the longer term, the option of developing and deploying at a later stage (ROAME aim 3);
- Section 4 sought information about the encouragement of the development of internationally competitive industries and the utilisation of capabilities for the domestic and export markets (ROAME aim 4);
- Section 5 asked questions about the quantification of environmental improvements and disbenefits associated with new and renewable energy technologies (ROAME aim 5);
- Section 6 sought views on programme management (aim 6); and
- Section 7 looked more widely at programme objectives, including possible means of improvement.

Within this framework, the questionnaire consisted primarily of multiple choice questions amenable to statistical analysis. In addition, some questions sought financial estimates, and others (24 of the 45 questions) offered opportunities for qualitative and unstructured responses.

The questionnaire was conducted during September and October 1998. Responses were voluntary but recipients who did not reply within 3 weeks received a follow-up phone-call, and finally, a follow-up letter was sent after another 3 weeks. It was difficult to analyse the questionnaire responses in a few areas because, perhaps due to the wide range of organisations involved, some parts were misinterpreted to some degree.

Twenty follow-up interviews were conducted, five of which were with respondents who had already returned a questionnaire, and the other 15 with others who had not undertaken the questionnaire. The interviewees were: representatives of the European Commission; British project developers; renewable energy technology manufacturers; lobby associations; and consultants. Some were judged to be able to provide both a general overview of the programme as well as expertise on an activity, while some interviews concentrated on discussing one activity. The interviewees represented the following areas of expertise: 3 general; 5 for wind energy; 5 for biomass; 4 for commercialisation; 2 for the solar industry; and 1 for hydropower. The interviewees were asked questions in three main areas: the ROAME aims of the programme; the

particular specialised area of the interviewee (where relevant); and the independent (but anonymous) views of the interviewee.

The interviews were a major source of information for the evaluation as a whole. This was partly because a questionnaire is necessarily a crude device for eliciting information of other than a relatively simplified nature, and partly because the interviewees were chosen for the authoritativeness of their views. In some areas like additionality and displacement, the views of interviewees were particularly important, because the issues were subtle. We have also given weight to the views of interviewees in our analysis because they displayed surprisingly similar views on a wide variety of important subjects, despite considerable diversity in their origins, current affiliations, and the extent to which they had benefited from particular aspects of the Support Programme.

Three programme areas (biomass, wind energy and commercialisation) were subjected to particular scrutiny in order to provide further information to allow the evaluators to answer specific issues that they were asked to address, such as value for money of programme expenditure and whether the NFFO has benefited from the programme. The results of these more intensive studies are integrated into the main analysis.

The evaluation suffered from one further and unavoidable methodological problem. During the 1994 to 1998 period the Support Programme was one part of an integrated programme, of which (by 1998) the NFFO consisted of some 90% by annual expenditure. Separating out the particular contribution of the Support Programme to the achievement of the ROAME objectives is therefore a difficult and ultimately not fully resolvable problem. A similar though less serious problem relates to the fact that the Support Programme has been in existence for over 20 years, which means that *results* during the 1994 to 1998 period will at least partly be a consequence of decisions and expenditure undertaken in earlier periods. These unavoidable limitations should be borne in mind in the following analysis.

5 ANALYSIS

a Overview

Of the 129 questionnaires sent out, 70 were returned, of which 62 were filled in. The overall response rate, excluding unusable questionnaires, was therefore 48%. This allows, as Appendix 5 explains, statistically significant results to be drawn. It is also a relatively high response rate for voluntary questionnaires of this sort. Questions seeking a Yes/No response had a response rate of between 74% and 89% (including Don't Knows), with the more complex multiple choice questions eliciting a wider range of responses, but in general a response rate of about half of those eligible to reply.

Overall, nearly 90% of the questionnaire respondents had received a publication, 82% had attended an event and nearly 70% of respondents had received funding from the

programme. Survey recipients clearly saw themselves as well informed about new and renewable energy, with between 63% and 77% of respondents regarding themselves as at least competent in the areas of expertise identified in the questionnaire. Around one fifth to one third saw themselves as possessing limited knowledge, while very few had no knowledge.

The interviews were essential in providing more depth and elaboration in key evaluation areas. In general the interviewees were highly supportive of this directed Support Programme and believed that failures to achieve objectives were largely to do with substantial cuts in budgets after the objectives had been set.

Overall, then there was a favourable response to the programme, and only in the area of programme management and the role of ETSU did persistent concerns emerge. These are discussed later.

The evaluators were asked to analyse eight specific issues, of which the three most important were the validity of the rationale (sub-section b below), the achievement of objectives (sub-section c) and overall value for money (sub-section i). However all eight issues have all been addressed and are discussed below.

b Validity of rationale

The primary rationale underpinning the programme was that there were a number of market imperfections which the integrated programme was designed to address in a cost-effective way (see **Appendix 1** for the full list of six imperfections). Not all of the six are imperfections in the strict sense. For instance, the presence of economies of scale in conventional energy supply (imperfection b in Appendix 1) or the existence of depreciated plant (imperfection c) are characteristic of almost all markets; nor would they commonly call for corrective Government action. Essentially, the list of six boils down to three major kinds of imperfection:

- the failure of existing technologies to meet all their environmental costs, giving them an unwarranted market advantage (the 'environmental externalities' argument);
- the existence of imperfect knowledge about renewables among several relevant communities, and the excessive risk-aversion to renewables investment to which this gives rise (the 'lack of information' argument); and
- the existence of inappropriate legislative and administrative procedures in relation to investment approval (the 'bureaucratic barrier' argument).

In the ROAME statement, no priority ordering is given to the six imperfections, but it seems probable that the first-mentioned - environmental externalities of conventional technologies - has always been regarded as the most important within Government. To the extent that this imperfection is important, it means that the prices charged by conventional energy sources do not reflect their full costs. The development of renewables (which generally give rise to fewer environmental externalities, for example in air pollution terms) is therefore disadvantaged by the market, and this justifies

Government support in favour of renewables. The problem is that the full extent of the externalities attaching to conventional technologies is not yet well established in quantitative terms, which means that the necessary degree of corrective market intervention is not clear. The other imperfections (lack of information and bureaucratic barriers) can be seen to a significant extent as deriving from the primary imperfection of environmental externalities.

The principal source of information on the validity of the rationale came from the interviewees (it was not thought appropriate to ask this question directly of questionnaire recipients). Few of the interviewees had much appreciation of the complexity of the six imperfections identified in the ROAME statement, but most gave a strong endorsement to the general validity of the market imperfection argument as a basis for Government action to support new and renewable energy. The three main imperfections identified above (environmental externalities, lack of information and bureaucratic obstacles) were all thought important by most interviewees. However it is important to stress that most interviewees took the need for a Support Programme as almost automatic, and had probably given little detailed thought to the precise form of the market imperfection argument.

We conclude that the market imperfection rationale was and remains entirely valid as a basis for the Support Programme, but that the argument, especially in terms of the six types of imperfection, was unnecessarily detailed, and contained some dubious argumentation (eg depreciated plant and economies of scale as an imperfection). The first-mentioned market imperfection, environmental externalities, has probably increased in importance since 1993, given substantial international activity and commitments in areas like climate change.

For the future it would be desirable to stress environmental externalities as the primary rationale, with others (lack of information, bureaucratic barriers) as significant, but only important as a driver because of the primary environmental externality rationale. It would be worth pointing to the evident success of the NFFO in reducing renewables prices as a practical demonstration that supporting renewables can lead to successful commercial implementation of renewable technologies. It is also important to stress that the uncertainties associated with climate change (and with nuclear power, another obvious candidate to help meet climate change problems) mean that renewable energy may play a critical role in future energy policy. In this sense the risks of *not* supporting renewables are not only highly uncertain, but also potentially very large indeed on certain plausible scenarios about climate change. In this sense the environmental externalities argument is really about an insurance policy against the externalities of fossil fuel combustion proving very large indeed.

c Achievement of objectives

Before considering whether or not the objectives of the Support Programme have been achieved, it is important to look at the realism of the objectives themselves, especially as

the ROAME aims and objectives applied to the integrated programme as a whole (including the NFFO), and the Support Programme budget was substantially scaled down from 1994/95 onwards. The original ROAME statement contained six main aims (**Appendix 2**) and a number of objectives within most aims, together with multiple targets within each objective (**Appendix 3**). As in the case of the rationale, there is considerable complexity here, and no priorities are clear.

It seems likely that the first two aims - encouraging technology uptake and stimulating technology development in partnership with industry - were probably primary in the minds of the policy-makers. Within the first, technology uptake aim, four sub-aims appear in the main summary statement (**Appendix 2**), and of these, the use of the NFFO as a market establishment mechanism clearly falls outside the scope of this evaluation. Other detailed aspects of the first aim are also beyond the scope of realistic delivery of the Support Programme. Thus, the targets to 'establish an appropriate financing regime by 1995' and to 'introduce updated and comprehensive planning guidance by 1996' are both well beyond the powers of the Support Programme to achieve. In the first case this is because financing regimes are largely the province of privately-owned banks, and in the second because the planning system is the province of the DETR rather than the DTI.

The second aim, of co-operatively establishing the development of technologies likely to become competitive in the short to medium term, was clearly a major task of the Support Programme. Because the NFFO could not, under European competition law, discriminate in favour of UK manufacturers or technologies, it was always the Support Programme that would bear the weight of this very important aim. It was an aim which required significant expenditure because it depended on financing a minimum level of R&D for each relevant technology in pursuit of detailed targets for each technology. When budgets began to be cut from 1994/95 onwards, it therefore became increasingly unrealistic. This is reflected in the revised ROAME aims of 1994/95 (**Appendix 4**), which removes this aim completely. It is therefore important in this evaluation not to judge the Support Programme to any great extent in terms of original ROAME aim 2.

Considering aims 1 and 2 together then, it is necessary to be careful to evaluate achievements only against those objectives which were feasible for the Support Programme to achieve, especially in the light of the 1994/95 budget cuts. The other significant change in aim in the revised objectives statement of 1994/95 was an extension to the environmental aim in terms of informing environmental policy-making by quantifying the contribution to environmental improvements by the use of new and renewable technologies.

The questionnaire asked if respondents thought that the programme should continue, whether the programme objectives were appropriate or whether the objectives should be clearer and their weighting altered. One of the highest positive answers of the questionnaire was in response to these questions: 85% said that the programme should continue. Furthermore, 64% of all respondents, and 75% of those expressing a view,

thought that the programme should continue to focus on the same objectives although 38% of respondents (70% of those expressing a view) thought that they should be made clearer or should change. Of the latter group, an equal number wanted an increase as wanted a decline in the effort to promote exports, with the other comments divided between those asking for the Programme to be more implementation-focused with more demonstration projects and the others asking for the programme to be more pro-active about the environmental benefits

Aim 1 Encouraging the uptake of technologies which are approaching competitiveness

As discussed above, some the demands of this objective are, to the extent that they relate to the NFFO or are clearly beyond the powers of the Support Programme, outside the scope of the evaluation. In practice, the main objectives relevant here are improvements in information (to the Government, public and industry in the first phase, and to the Government and industry later on).

The questionnaire response here was positive with 36% (70% of those who thought it a relevant question to them) saying that the Programme had reduced the risk of the respondent entering the renewable energy industry; 36% said that it had enabled them to overcome non-technical barriers, and of those, 70% said the Programme had reduced a lack of understanding at management levels while 56% thought that it had increased the acceptance of renewables within financial circles. In addition, 44% stated that the Programme had helped them to have a greater presence in the renewable energy industry.

One of the sub-objectives of Aim 1 was to 'ensure the market and general public are fully informed' and this was modified in 1994/5 'to provide information and understanding which will improve the assessment of the technologies and facilitate their uptake'. With respect to the quantitative questionnaire results, 61% thought the programme provided easy access to information and a similar number thought that there was good transfer of information gathered through the programme to the public domain. Furthermore, questionnaire recipients involved in education made positive comments about the use of ETSU publications; those recipients working within the planning area said that ETSU publications had been an important source of information; and, as described above, a large percentage of respondents had attended an ETSU event or had received an ETSU publication. This provides a positive picture of the transfer of information from the programme to interested parties. This is particularly welcome given the reduced expenditure in the marketing and promotion areas over the evaluation period.

Keeping these broadly positive results in mind, the question of dissemination and technology transfer was a topic which attracted a large number of both written and interviewee comments. These generally expressed the view that the programme should be disseminating more information to the broader general public about the need for, and benefits of, renewables. The comments included suggestions that this could include more

information about: Government goals for renewables; environmental benefits; the green electricity market; industrial possibilities; and future employment. ETSU is known as a source of information by those tangentially involved with renewables (such as planning officers or financiers) with 71% of recipients having first heard of ETSU and then contacting them. However, the comments expressed the view that more 'outreach' is required for less targeted groups. (Other issues about information-sharing in a competitive market and the role of ETSU are discussed later).

Another area under Aim 1 which attracted substantial comment was with respect to planning issues. The expanded ROAME statement has the introduction of 'updated and comprehensive planning guidance by 1996' as a sub-objective although planning is not mentioned in particular in the modified objectives of 1994/95. While ETSU does not provide planning advice for specific projects, several questionnaire and interviewee comments centred on the need for the DTI to initiate more projects designed to overcome the current problems of obtaining planning permission for renewable energy projects. Planning has been a particular problem for the Support Programme because the planning system is DETR responsibility, but this does not necessarily preclude DTI involvement in the specific planning problems of renewables which, especially in the case of wind power, are acute, given the dispersed nature of sites and the sensitivity attaching to some of them.

Aims 2 and 3

The questionnaire asked recipients about these two objectives within the same section. These aims were the stimulation of technologies likely to become competitive in the short to medium term (aim 2), and assessing, and maintaining (for technologies which have prospects for the longer term) the option of developing and deploying at a later stage (aim 3). Aim 2 disappeared from the 1994/95 revision to ROAME objectives, while Aim 3 was significantly downgraded to assessment rather than maintenance of options. This makes the evaluation of achievement in these two areas problematic.

With respect to Aim 2, eighteen companies and eight patents were listed as having been created as a result of the Programme. While it is questionable whether this result is solely to do with the Programme alone during the 1994-1998 period, it is still a very positive result and suggests that part of Aim 2 was fulfilled despite its removal early in the evaluation period. It perhaps illustrates the methodological point made earlier that some positive results achieved over 1994-1998 were mostly a consequence of earlier policy and expenditure, especially as the focus of much of the earlier Programme was precisely towards technology development by industry.

Also in relation to Aim 2, 80% of those with a view thought that risks had been reduced; half of those with a view thought technical development in their organisations had improved as a result of the Programme, while two thirds thought their skill levels and the level of industry involvement had increased. Similarly, 60% saw results in terms of new products, and around half saw improved products and services, turnover and new sales.

Interview responses also suggested that in this technology development area the Programme had achieved notable successes.

With respect to Aim 3, 44% of the recipients said that they had been involved with the activity. Of these, nearly 80% thought that the DTI has done well in estimating the costs and potential of longer term renewable technologies. The results were less positive when asked how well the information was transferred to Government and industry with an equal number (about 30%) considering that the programme had done poorly as had done well. The written and oral replies with respect to this aim included comments which related to the Programme's slowness in taking-up offshore wind. There were also several comments about the slowness of Government to take up technology policies which the programme had shown to be positive, such as more vigorous promotion of small-scale, dispersed technologies including wind, hydro and non-electricity solar technologies.

Aim 4 Encouraging Internationally Competitive Industry

This aim is concerned to promote the development of internationally competitive industries to exploit the domestic and export market for new and renewable energy technologies, while taking account (an addition in the 1994/95 ROAME objectives) of what influences business competitiveness. This aim was not relevant to a number of recipients.

Of those answering questions in this area, 80% thought that the programme had reduced risks for their organisations, two thirds thought that it has increased skill levels, two thirds thought it had increased industrial involvement and about half in each case thought it has resulted in new or improved products and services, new and increased sales and improved product quality.

With respect to this rather focused objective of encouraging an internationally competitive industry, of those who considered it applicable to them (about 70%), roughly an equal amount thought that the programme had helped them to exploit the domestic market as those who thought the programme had not helped them.

However, the picture was less favourable with respect to exports and international competitiveness. Some 30% of respondents regarded the question as of no relevance to them, but of those who did find it relevant, almost twice as many (37% of the 62) believed that the Programme had not helped them to find or develop an export market as believed that it had (19%). This is by some way the largest single negative finding in the questionnaire and was confirmed by the responses of a number of the interviewees. Some further treatment of the issue is therefore warranted

Export promotion was only added to the Programme as an objective in 1994. Selling in a highly competitive international market is in any case inherently difficult; and that the earlier phases of the Programme emphasised the home market alone. Nevertheless the

evidence here suggests that the international competitiveness aim has been fulfilled to only a limited extent so far, and that any future programme will need to pay close attention to better ways of fulfilling this aim, given that the size of the international market is expanding rapidly, both in the EU and more widely.

Aim 5 Environmental Assessment

The aim here is ‘to quantify environmental improvements and disbenefits associated with new and renewable energy technologies’ and within the modified 1994/95 objectives this is enlarged ‘to inform environmental policy making’ as well. The questionnaire results reflect a broadly positive view that the activity had informed the recipients of environmental improvements as a result of exploitation of renewables and that the activity had addressed the major areas.

More respondents (32%) believed that environmental assessment had not been of benefit to them than believed that it had been beneficial (23%). However, the issue attracted very little written comment of a critical nature, nor very much critical comment from interviewees, and it is therefore likely that many respondents did not find the issue of much relevance to them. It is important to bear in mind here that the main client for the environmental assessment objective is in any case the Government itself rather than, to any major degree, the industry. This largely explains the relative lack of interest of many respondents in this issue, though arguably better awareness of the results of environmental assessment could enhance the ability of many Programme participants to argue their case and pursue business objectives.

Aim 6 Programme Management

This issue is discussed in more detail in the later section on the overall effectiveness of programme management.

Overall, the Programme has made significant progress towards those aims and objectives that may be considered relevant in the light of the problems created by the reduction in expenditure levels from 1994/95. It has also made a substantial contribution to delivering the Government’s broader objectives in this area. There is strong support amongst the new and renewable energy community for continuing the programme with broadly similar aims. Inevitably, however, the declining budget has had an impact and not all the original aspirations have been delivered, especially in the technology development area. The original ROAME objectives however were wider than those strictly attributable to the Programme alone.

d The scope for alternative objectives

The Programme objectives are intended to work towards overcoming the market imperfections set out in the rationale. However, it is important to note that in the original

1993 internal ROAME document the rationale makes clear that ‘it is unlikely that the programme will be able to overcome completely all of these imperfections but it will address market failures in a cost effective way’.

The objectives in the ROAME statement relate to the Support Programme, the NFFO and the DTI ‘task force’ role, otherwise collectively known as the integrated programme. As this evaluation is only concerned with the Support Programme, it has been important to assess which objectives are relevant for the evaluation. While we accept the desirability of having an ‘integrated’ programme, it would be sensible to ensure that the objectives in future are clearly separated between, and related to, the different parts of the integrated programme. It would therefore seem preferable that a new ROAME statement should clearly differentiate the objectives between the three parts of the programme.

A second issue for the future concerns questions of priority. As in the case of the rationale, the aims and objectives of the Programme are specified in great detail but without any explicit attempt to prioritise among them. We have in this evaluation chosen to suppose that the earliest-named aims are the most important, and there is a certain amount of circumstantial evidence to support this view. However, the original 1993 ROAME statement specified 6 aims, 11 objectives and 30 targets, all apparently on a basis of equal importance. In circumstances such as those of 1994/95, when budgets are cut severely, a clear indication of priorities would have helped to focus managerial attention on critical issues. The revised 1994/95 statement of objectives contributed significantly to this need but still lacked any explicit sense of priorities. For a future statement of aims and objectives, such indications of priority would help implementation.

A third issue concerns the level of detail in objective-setting. It is understandable that the Programme identified specific targets as these can potentially provide quantitative benchmarks for the evaluation of programme performance. However as we have argued above, some of the more specific and quantifiable targets (eg establishing an appropriate financing regime by 1995) were simply unrealistic, and to judge the Programme against such a target consequently unfair. While we believe that specificity and quantification in objective setting is desirable where possible, it is also necessary to recognise that Government programmes of this sort exist precisely because of large uncertainties, and that the risk - in quantifying objectives too narrowly and quantitatively - is that the process presupposes more knowledge about what is realistically achievable than is available. On balance then, 30 separate targets for a Programme spending only £11 million annually is probably too many, and risks dispersion of effort. Future objective setting should take care not to establish too many objectives and targets, as well as prioritising among them.

e Additionality, displacement and quantification of benefits

Additionality is the extent to which activities take place because of the Programme under consideration, and which would not have otherwise occurred. Displacement refers to

activities which would probably have taken place without Programme intervention, but which were prevented by Programme activities. Clearly a major objective of public programmes of the kind evaluated here is to maximise additionality and minimise displacement (assuming that the additional activities are themselves inherently worthwhile).

Respondents to the questionnaire and interviewees both strongly felt that additionality had been powerful and that displacement had hardly occurred. Among respondents to the questionnaire, in 12 out of 13 areas of activity, more respondents believed that the programme had increased their activities than believed that there had been no impact (only in export promotion was this perception reversed). The conviction that there had been additionality was particularly strong in the areas of risk reduction, R&D activity and improvement to skill levels, where roughly half of all respondents judged additionality to have occurred. Conversely well under 1% of responses were to the effect that there had been displacement (activities reduced because of the Programme).

The issue of additionality and displacement were pursued further with interviewees. In general, they strongly confirmed the virtually universal conviction that there had been significant additionality and no significant displacement. One reason for believing that additionality had been the rule was that the renewable energy industry had been supported by the Programme almost across the board, and that there were few significant companies beyond the 600 or so institutions in the industry that might realistically be expected to have entered into the Programme's activities if the Programme had not existed. One possible exception to this was the large UK-based oil companies, which had recently publicly committed themselves to large new R&D and other development work in renewables, particularly in photovoltaics. Interviewees believed that in general the oil company effort would likely have been similar (and with similar timing) in the absence of the Programme, partly because these oil company initiatives are much more international in scope, as well as much larger, than the Support Programme's approach.

Another important indicator in the areas of additionality and displacement is the issue of the extent to which the Programme has been used to leverage extra private sector money into the same Programme areas. High leverage is indicative that the areas supported have been appropriate and that additionality that has occurred has been in high priority areas. There has not in the Support Programme been a high priority given to leveraging private sector money, and despite the detail of the Programme's aims and objectives, the commitment of the private sector to putting up its own money has never been among them. The questionnaire did not ask about leverage and few interviewees regarded it as an important feature of the Programme. Two explanations for the low priority to leverage objectives are that:

- the Programme largely created the industry it supports, and the small players in the industry were unlikely to be able to put much of their own money in, especially in the early days;
- grants have for the most part been extremely small and specific in their targets.

However these explanations are only partial, and it is true that leverage has been an issue that has been given increasing attention in recent years, especially as some of the firms supported have been larger than in the early years. Regional Electricity Company (REC) contracts to study renewable energy potential in their own areas were funded on the basis of a 50/50 split in cost between Government and REC, and there are other cases in which contracts were let on the explicit basis that the beneficiary companies would contribute equipment and time. For the future, as the renewable industry matures and company size becomes larger, leverage should become a much more important issue.

Turning to the attempt to quantify benefits, questionnaire respondents were asked to put monetary values on the benefits they have gained from the programme, or to express in percentage terms the increase in certain indicators, such as turnover. In a very few cases, respondents gave monetised estimates of benefit, and in a few more some percentages were reported. However a large majority of respondents felt unable to assess benefits in either form, though there were nearly thirty written responses describing positive, quantitative impacts of the programme as a result of being given financial support (though in most cases the quantification was not in monetary form). Until full commercialisation occurs, monetary valuation of benefits is difficult or impossible, and several areas of Programme support (eg better access to information, opportunities for collaboration, support for technical development) do not lend themselves to monetary quantification. 'Intermediate' benefits of this latter sort clearly have been important and widespread, but very difficult to estimate quantitatively.

Several companies reported that their businesses were booming, and some said that this was directly attributable to DTI Programme grants. Several companies provided: the value of increased turnover; forecast increase in turnover; numbers of new staff; value of EC projects; value of new products; and value of increased exports. In all these cases, the receipt of DTI programme grants was believed to be an important contributor to success, especially in very early stages. In all these cases, it is clear that the monetary benefits attributable to the programme greatly exceed the size of the programme grants, sometimes by an order of magnitude or more. Net present values in these cases will have been exceptionally high, and in these cases there has been excellent value-for-money.

As a result of the case studies, the evaluators have become aware that there have been cases where relatively large grants over considerable periods, often extending back to the previous programme periods, have produced low quantifiable returns. Again specific numbers cannot be calculated, but there have also been cases where the intended outputs have failed to materialise, in which case there will have been substantial net losses. Overall, the interviews concluded that, *with hindsight*, some different choices of project support might have been better made. However, the interviewees also stated, given the problems of project choice and declining Programme expenditure, the Programme probably did as well as it could. This is supported by questionnaire results.

Questionnaire respondents gave information of a more qualitative kind about the benefits of the programme. Both those who had been funded and those who had been users

confirmed the benefit in qualitative terms of the Programme. Increased research and development activity, useful collaboration and networking, technical development and skill levels were identified as 'intermediate' benefits by most. More directly, commercial benefits such as increased competitiveness, new and improved products, increased turnover were identified by about a third of those responding to the relevant question. Negative impacts from programme support were almost non-existent.

The questionnaire also tried to establish the qualitative benefits of being a 'user' of the programme as compared to gaining financially. There were 34 positive written comments related to the qualitative impact of the programme, which included benefiting from networking with potential commercial partners; advice which had led to successful applications for European Commission funding or elsewhere; increased awareness allowing them to help their customers understand the renewable world better; and information which had been useful in developing planning advice.

f Relation to the NFFO

The Support Programme is intended to be complementary to the NFFO process. As the interviews made clear, the successful completion of the research, development and demonstration cycle of a technology is a vital step before it enters the final market enablement step. The rationale of the programme also reflects this view. That some technologies supported by the Programme in earlier periods have been so successful in reducing their prices within the NFFO process (for instance wind power and waste to energy) is a confirmation that they reached an appropriate stage as they entered the NFFO, though it is difficult to say to what extent this was attributable to the Programme as opposed to external influences. Other technologies, less successful in the NFFO, are also those technologies which have benefited less from the Support Programme, and were consequently less ready for commercialisation. This was a view widely supported by those interviewees who knew about both the Programme and the NFFO. The evidence is limited and partly circumstantial, but points to at least some positive contribution from the Support Programme to the achievements of the NFFO.

The implication is that if the target for renewable supply increases, the demands on the Support Programme will almost certainly increase. For example, if biomass and offshore wind are to be promoted via the NFFO, this will almost certainly require the Support Programme to spend resources on further RDD&D as an early part of this process. It is difficult to see how this could be done without some increase in future Programme expenditure.

The evaluation concludes that the Programme has added some value to the NFFO in terms of success of commercial deployment of technologies originally supported by the Support Programme. A full judgement on the success of the Support Programme over 1994-98 in helping commercialise renewables necessarily awaits a future evaluation, as the time period between Support expenditure and commercialisation is often longer than four years. Whether the Programme has reduced the cost of the NFFO to electricity

consumers by allowing development of technologies in advance of commercialisation has been difficult to test conclusively. While it is possible that this has occurred, evidence is hard to collect, because without the Support Programme, the NFFO would in some respects have taken a different form, and this is hard to construct in counter-factual form, and therefore hard to cost.

g Wider benefits (including collaboration with other programmes)

The evaluation clearly showed, through interview responses, that there is value in collaboration with other programmes. As the Programme rationale makes clear, the largely successful attempt on the part of the Programme to maximise UK receipts of external funds is welcome, and the Programme has had considerable success in this, as interview results clearly show. With respect to the advice given by ETSU concerning EC projects, the questionnaire results clearly endorse that it is both appreciated and productive.

Moreover, the European Commission has been a large source of funds to the UK. In the 1997/8 proposal round for Thermie, the UK gained 18.1% of the total support given, equivalent to 4.2 million ECUs (£3 million). With respect to the 3rd Joule call, the UK received 14.2 million ECUs (£10.2 million) or 13.7% of the total. And finally, with respect to the Altener programme, the UK received 473,000 ECUs (£338,000) or 15.4% of the total in 1997. Although this cannot all be said to be directly a result of the programme, it can be said that programme advice increases the ability of UK companies to put in successful applications.

h Overall effectiveness of programme management

The Support Programme is, overall, the responsibility of the DTI, as is the wider integrated programme. The DTI is the source of funds and is responsible for policy directions and effective integration with the NFFO. There is also a DTI 'Task Force' with responsibility for project selection within the Programme. The management of the Programme is the responsibility of ETSU, which has a wide range of responsibilities, including:

- programme management and administration;
- support in the areas of contracts and finance;
- technology and information transfer; and
- strategy and evaluation.

In addition there are various advisory structures supporting the programme. This includes the Renewable Energy Advisory Committee (REAC) which meets around 4 times annually and considers the ongoing Programme, and a range of advisory committees relating, in principle, to each area of the Programme. This committee structure is the main formal means by which the wider renewable energy community participates in the Programme, though the frequency of meeting (and apparent effectiveness) of these Programme area committees is variable.

The DTI role was generally endorsed by respondents to the questionnaire and interviewees. There was a positive endorsement of the DTI 'task force' in choosing projects, and the overall policy position of the DTI was broadly approved. A large number of recipients agreed that the Programme chose the appropriate projects for analysis (68%). The major criticism, mentioned earlier, was that the DTI had been slow to take up offshore wind and had little appreciation of the need to support small-scale and highly decentralised technologies, but these were mentioned by few respondents or interviewees. Some questionnaire respondents were confused about the roles of DTI and ETSU, usually in assuming that the DTI performed a role that was in fact the province of ETSU.

Two major questions of overall strategy are relevant to both DTI and ETSU. These were the overall quality of technical judgements made, and the appropriateness of reaction to the reduced budgets available for the Programme after 1994. On overall technical judgement, generally questionnaire respondents and interviewees were highly supportive of the technical judgements made. While some believed that in certain areas - offshore wind, and more local and dispersed technologies were those most frequently mentioned - earlier commitments could have been made, and while it was clear that some areas of support had not proved successful, almost everyone believed that a systematically better standard of technical judgement would have been difficult to achieve.

On the question of responses to budget cuts and the reduction in the size of the Programme, the decision made after 1994 was to continue to support all main Programme areas, while cutting out both public dissemination and stimulation of technologies with commercial potential. An alternative would have been much more radical surgery, cutting back on some less promising technical areas completely, and permitting similar levels of spending to persist in more promising areas. There was much support among interviewees for the strategy actually adopted of keeping most things going at reduced scale. The most important argument used here was that most of the areas supported suffered from considerable uncertainty, and it would have been difficult and risky to back a few potential winners in the state of information that then existed. There was however some criticism of cutting out public dissemination on the grounds that there was still too little information available to the public on the issues surrounding renewables.

In relation to the basic programme management function performed by ETSU, twice as many recipients thought that information was transferred well from the programme to the public as disagreed with that statement, and 82% thought that ETSU has accessible and responsive staff. Interviewees generally believed that ETSU's internal quality assurance procedures, designed to ensure quick and effective managerial responses, worked well.

However in relation to two of the other functions performed by ETSU, technology transfer and strategy and evaluation, there was a relatively high level of disquiet among

questionnaire respondents. Much the highest number of critical written comments (18) referred to programme management arrangements, and nearly all were directed at ETSU in relation to technology transfer, and strategy and evaluation.

The origin of this disquiet seems clear: ETSU originally performed a wide variety of Programme services as a public sector centre of excellence from the 1970s onwards. Privatisation in 1996 made it inappropriate for a 'centre of excellence' to be based on a special relationship with Government, and some companies receiving funds from the Programme (especially consulting companies) are now in direct competition with ETSU in markets for contracts, especially abroad.

The relationship between the DTI and ETSU changed in the run-up to ETSU/AEAT privatisation, and ETSU now holds contracts of a broadly commercial kind for its various roles in the Programme. As these contracts expire, so the process will be open to commercial competition, but at present it remains true that ETSU performs a number of management functions in the private sector without yet having had to submit to competitive tender against its competitors.

There are two main kinds of important concern that some companies and individuals have in their relationship to ETSU:

- some are reluctant to share information derived from the Programme with ETSU because they believe ETSU already holds privileged positions in relation to information across the whole field of renewables by virtue of its multiple management role;
- some are suspicious of the closeness of the relationship between DTI and ETSU, especially in relation to ETSU's continuing role in relation to strategy and evaluation.

In both cases the fear expressed is that ETSU will be able to gain competitive advantage in other markets (eg in Europe and elsewhere) where ETSU and other Programme participants compete directly for business.

How much damage this dominant ETSU managerial position does to the Programme is difficult to judge. To the extent that information sharing is restricted this is a clearly negative result, but the extent of this is uncertain and as reported earlier, the great majority of questionnaire respondents rated the effectiveness of information and technology dissemination very highly. Perhaps most serious of all is the combination of ETSU's role as programme manager, having access to a large amount of information on participating companies, with its role in strategy and evaluation, where it seems to have privileged access to the DTI in terms of determination of future policy.

There are clearly ways in which these problems can be alleviated in the future. The process of competitive tendering for management roles will itself be important, as will the clear need to separate the different management roles currently performed by ETSU, and their future distribution among several different companies. ETSU occupies a dominant role in the Programme for entirely understandable historic reasons, but this dominance will need to be reduced in the future. One way of ensuring this in the short

term might be more emphasis on formal consultation with the renewables industry, through more regular meetings and representative composition of advisory committees for Programme areas, and for less informal consultation between the DTI and ETSU.

i Overall value for money

The question of value for money for the Programme as a whole is critical. This involves balancing costs against benefits and reaching a judgement about the extent to which the benefits have exceeded the costs.

The costs of the Programme over the 1993/4 to 1997/8 period have been approximately £62 million over the four years, falling in annual terms from £19 million to £11 million. This has been a difficult process to manage as the initial planning expectation in 1993 was that the Programme would continue to spend at a level of above £20 million annually for several years into the future.

As the overall budget has fallen, so too has the level of ETSU costs, but ETSU costs have fallen less rapidly than expenditure on external contractors. As can be worked out from Table 5, the fall in the overall budget over the five year period amounted to 56%: external contractors experienced a 62% reduction, while ETSU's reduction was only 40%. It was clearly important to allow ETSU time to adjust to the fall in the overall budget and to the situation of its privatisation. There are also good reasons why ETSU's costs in managing the Renewables Support Programme are proportionally higher than their own costs in managing other programmes (for instance in the Clean Coal programme, ETSU's management costs over the same period were only 15% of total expenditure, though technology transfer was also included). The main reason for the higher costs in renewables is that the Support Programme covers a wide range of detailed activities, and lets a very large number of mostly small contracts in a highly directed programme.

Table 5 Cost of Programme Management as a Percentage of the Total Provision

Expenditure	1993-4	1994-5	1995-6	1996-7	1997-8
ETSU (£m)	7.2	7.1	6.0	4.5	4.3
External (£m)	18.0	12.0	12.2	9.4	6.8
TOTAL (£m)	25.2	19.1	18.2	13.9	11.1
ETSU as % of total	28	37	33	32	39

Nevertheless 'central' costs as high as 39% of the total budget (compared to 28% in 1993/4) are a very high proportion, and there seems a need to find ways of reducing the proportion of management costs in a future programme.

Turning to Programme benefits, it is remarkable how far the Programme has managed to achieve so high a proportion of those original ROAME objectives that can fairly be asked of it. Considerable ingenuity and flexibility have gone into the process of pursuing

a wide range of objectives with considerable success. Among the benefits achieved by the Programme the following may be highlighted:

- a very large degree of additionality and virtually no displacement of existing activities;
- a major reduction in perceived risk levels in many relevant quarters, including the financial community;
- significant technical development as measured by patents, establishment of new companies and new activities within existing companies;
- significant and wide-ranging upgrading of skill levels;
- the establishment of a number of new products and services in the market;
- good transfer of information and technology to relevant parts of the industry and Government;
- higher levels of industrial involvement with new and renewable energy technologies;
- effective assessment of the prospects and costs for longer term technologies;
- effective assessment of the environmental benefits of new and renewable technologies; and
- in a few cases, very large quantifiable benefits in terms of increased profits or turnover for some companies receiving Programme funds.

However, although these achievements are substantial, it has not been possible to quantify them to any large extent in relation to the total budget expended; nor has it been possible for several of the achievements (including those of a more qualitative or intermediate character) to be sure that how far across the board they extend. It has also been difficult to evaluate how far these same achievements might have been reached with a different and potentially cheaper management style or total expenditure. None of these qualifications are surprising in evaluating a diffuse Programme based on RD&D, where economic benefits may take time to emerge and are difficult to quantify precisely. Overall, then, although the Programme has been quite successful, it is not possible to judge whether it has offered good value for money

6 CONCLUSIONS

The main conclusions of the evaluation are as follows:

Validity of Rationale

The basic rationale underpinning the programme was that there were a number of market imperfections which acted in favour of established technologies and against new and renewable technologies, and that this justified intervention in favour of helping renewable energy to become established. Six separate market imperfections were listed in the ROAME statement, without any evident priorities. The primary imperfection however (and the first mentioned) was the presence of environmental externalities which artificially reduce the market price of conventional energy sources. Most of the other valid market failures which are listed in the rationale such as of lack of information and

awareness, administrative and legislative barriers, appear to be mainly a consequence of the primary market imperfection.

The rationale for the Programme continues to be valid, but developments over the last few years suggest that in the future even more weight might reasonably be put on the environmental externality argument, even though precise quantification of the size of these externalities is difficult and not yet fully established. The risks of *not* developing renewables in plausible climate change policy scenarios are quite uncertain and potentially quite large.

Achievement of Objectives

Aims and objectives of the Programme were detailed, and mixed together with objectives for the wider, integrated programme including the NFFO. The Support Programme has nevertheless made significant progress towards achieving its objectives and made a substantial contribution to delivering the Government's broader objectives in this area. There was a widespread belief that there had been much additionality achieved and virtually no displacement of private sector activity.

There is strong support amongst the new and renewable energy community for continuing the programme with broadly similar aims. Inevitably, however, the declining budget has had an impact, and not all the original aspirations have been delivered, especially in the area of technology development. The original ROAME objectives however were wider than those strictly achievable by the programme alone and extremely detailed.

For the future there is much to be said for prioritising and simplifying the statement of aims and objectives, despite the attractions of setting out detailed and quantified targets as a basis for assessment. Inherent uncertainties in a Programme of this sort make such precision often inappropriate.

Value for Money

Many of the original Programme objectives have been fulfilled despite the large and originally unplanned reduction in financial provision. That the programme has fulfilled its objectives to the extent that it has, given these financial cuts, has shown ingenuity and flexibility. However, the percentage of the total programme provision spent on 'central' costs, although understandable, has been high in recent years. The various management tasks undertaken by ETSU should be split between different companies in future and be subject to competitive tender. This action would also help reduce the perception among some Programme participants of ETSU's dominance in the Programme, now inappropriate in a private sector context because of the competitive relationship between ETSU and some Programme participants. Overall, it is difficult to judge whether or not the Programme has provided good value for money, mainly because it has proved

impossible (not uncommon in evaluations over a short time period of an RD&D based programme) to get an across-the-board quantified view of Programme benefits.

The evaluation was required to assess a number of other issues. These were all addressed and the key findings were:

- that in future the objectives of any supporting programme of RDD&D and technology transfer should be more clearly delineated from the objectives of other parts of the Government's overall N&RE programme such as the NFFO and administrative action;
- that the programme has added value to the NFFO in terms of success of deployment though whether at lower cost has been difficult to discover.

Other issues which attracted significant comment, outside those which the evaluators were asked to assess in particular, were related to a need for more activity in planning guidance, more dissemination of information to the general public, and more formal industrial input into the programme.

Appendix 1

Extract from the ROAME statement for the Programme for New and Renewable Energy Technology

Market Failures forming programme rationale

There is substantial scope for improving the operations of the market for new and renewable energy technologies. Many of these technologies are still immature and need further development and demonstration to be able to compete with established fuels. There are however a number of market imperfections:

- a) At the present time competing technologies do not meet the cost of abating the environmental pollution they cause and hence are able to offer energy at prices which exclude these costs.
- b) Substantial economies of scale give established conventional energy suppliers significant market power and make it difficult and financially risky for new and renewable energy technologies to enter the market on an efficient scale.
- c) Long established conventional energy suppliers are able to sell at prices related to historically depreciated plant. This makes it difficult for new technologies to enter the market.
- d) Since the scale and timing of the returns from investment in new energy technologies is uncertain, industry is reluctant to make the investment which these resources require. Small companies in particular do not have and would not be able to raise the required resources.
- e) There is a lack of awareness and understanding of the capability of new and renewable energy technologies and they are perceived as novel and high risk by customers, potential suppliers, planners and financiers.
- f) Legislative and administrative procedures have evolved relating to conventional plant not for the typical small-scale and often rurally located new and renewable energy plant. This creates barriers for the up-take of novel technologies.

If the economic and environmental potential of new and renewable energy technologies is to be exploited, a stable, long-term framework will need to be established by Government within which a market, and for an industry to supply this market, can grow and become self sustaining. It is unlikely that the Programme will be able to overcome completely all of these imperfections but it will address market failures in a cost-effective way.

Appendix 2

Extract from the ROAME statement for the Programme for New and Renewable Energy Technology

Programme Aims

The proposed programme aims to develop the technologies and industrial and market infrastructure so that new and renewable energy technologies can compete equitably in the market. This will entail:

1. Encouraging the uptake of the technologies which are approaching competitiveness by:
 - assessing when technologies become cost effective;
 - establishing an initial market via the NFFO mechanism (**in practice expenditure under the NFFO has been outside the Programme**);
 - removing inappropriate legislative and administrative barriers;
 - ensuring that the market is fully informed.
2. Stimulating in collaboration with industry the development of technologies which are likely to become competitive in the short to medium term.
3. Assessing and maintaining, for technologies which have prospects for the longer term, the option of developing and deploying at a later stage.
4. Encouraging internationally competitive industries to develop and utilise capabilities for the domestic and export markets, taking account of what influences business competitiveness.
5. Quantifying environmental improvements and disbenefits associated with the new and renewable energy technologies.
6. Managing the programme effectively.

Appendix 3

Extract from the ROAME statement for the Programme for New and Renewable Energy Technology

Detailed Objectives and Targets for the Programme

Detailed objectives and quantifiable targets for the overall programme are as follows. They relate to the broad objectives/aims for the programme, as presented in Section 2. In addition, all of the component programmes for the various technologies are based upon testable objectives, as outlined in Appendix 1.

AIM 1:

Encouraging the uptake of the technologies which are approaching competitiveness by:

- assessing when technologies become cost effective;
- establishing an initial market via the NFFO mechanism;
- removing inappropriate legislative and administrative barriers;
- ensuring that the market is fully informed.

Objective 1

To assess when each technology would become cost effective by monitoring energy prices, technical developments and market penetration in order to facilitate the development of an initial market for each technology.

Targets:

1. Review every 5 years the Government's strategy for the development and implementation of new and renewable energy technologies.
2. Review annually and publish the prospects for new and renewable energy technologies in the UK and the progress in achieving the aims of the Government's programme.

Objective 2

To demonstrate the most promising technologies in a commercial environment.

Targets:

1. Make progress towards the 1,500 MW DNC figure by 2000 (equivalent to about 6TWh/y of electricity).
2. Publish by end FY 93/94 an indicative framework for future NFFO Orders, bearing in mind the need to avoid creating legitimate expectations which cannot be fulfilled.
3. Test market enablement by reducing (in real terms) the premium price paid to renewable energy generators under successive NFFO Orders.
4. Provide, in consultation with OFFER and the Regional Electricity Companies, advice on the arrangements for each of the future NFFO Orders.
5. Assess the need, and possible mechanisms, for an initial market support scheme for heat producing new and renewable technologies by 1995.

Objective 3

To identify and remove inappropriate legislative and administrative barriers.

Targets:

1. Establish an appropriate financing regime for new and renewable energy technologies by 1995.
2. Introduce updated and comprehensive planning guidance by 1996.
3. Complete the current round of planning studies and review the need for further studies in 1994.
4. Monitor the uptake of new and renewable energy policies resulting from Planning Guidance by 1994.
5. Ensure that, where appropriate, coverage of technical standards and certification procedures for new and renewable energy technologies is comprehensive, and applicable throughout the European Community.

Objective 4

To ensure that the market and the general public are adequately informed.

Targets:

1. Conduct business development strategies with each REC and other major developers by 1998.
2. Stimulate the development of education and training for the primary, secondary, tertiary and professional sectors by 1998.
3. Provide timely, accurate, comprehensive and independent information and advice on new and renewable energy technologies (refer to Marketing and Promotion Programme for particulars).

AIM 2:

Stimulating in collaboration with industry the development of technologies which are likely to become competitive in the short to medium term.

Objective

To stimulate in collaboration with industry the development of each technology likely to be competitive in the short to medium term.

Targets:

1. See detailed targets for each technology.
2. Undertake the necessary R&D to introduce each technology into NFFO (or alternative) approximately 5-8 years before it is expected to be competitive.
3. Achieve the industrial contribution to R&D in each technology to meet annual targets and overall target (in Figure 2).

AIM 3:

Assessing and maintaining, for technologies which have prospects for the longer term, the option of developing and deploying at a later stage.

Objective

To assess technologies with prospects of becoming longer term options undertaking R&D if necessary, otherwise maintaining a 'watching brief'.

Targets:

1. See individual technologies.
2. Assess, at a maximum of 5 yearly intervals, each of the technologies to establish whether they offer cost effective policy options for energy generation and pollution abatement, recognising that in direct cost terms they may not be cost effective at the present time.

AIM 4:

Encouraging internationally competitive industries to develop and utilise capabilities for the domestic and export markets, taking account of what influences business competitiveness.

Objective

To promote the development of internationally competitive industries to exploit the domestic and export market for new and renewable energy technologies, taking account of what influences business competitiveness.

Targets:

1. Produce an assessment for the export prospects of each appropriate technology by 1996.
2. Conduct a business development study with suppliers of each appropriate technology by 1995.
3. See individual technologies for technological support.
4. Establish a system to inform industry of the export prospects by 1995.

AIM 5:

Quantify environmental improvements and disbenefits associated with new and renewable energy technologies.

Objective 1

To quantify the contribution to environmental improvements and national/international targets from the exploitation of new and renewable energy technologies.

Targets:

1. Assess contribution for each nationally/internationally agreed target and update annually.
2. See detailed individual targets for each technology.

Objective 2

To identify and appraise the environmental disbenefits of each of the new and renewable energy technologies, and in conjunction with industry and others take such action as might be appropriate to ameliorate those impacts and hence facilitate the development of a market for that technology.

Target:

1. See targets for each technology.

AIM 6:

Managing the programme effectively.

Objective 1

To review the programme as a whole.

Target:

1. To review the programme as a whole, at intervals not exceeding 5 years.

Objective 2

Secure maximum benefit from international collaboration.

Targets:

1. Achieve a contribution from EC sources equivalent to 25% of programme costs.
2. Devote 2.5% of programme funding to international information and co-ordination activities.

Appendix 4

New and Renewable Energy Programme - Modified Objectives 1994/5

- 1.1 To improve understanding within Government and the market of the overall magnitude, distribution and cost of the UK new and renewable energy resources and their likely rate of exploitation.
- 1.2 To establish an initial UK market for those technologies approaching competitiveness.
- 1.3 To remove inappropriate barriers to deployment.
- 1.4 To ensure that the market and general public are adequately informed.
- 1.5 To provide information and understanding which will improve the assessment of the technologies and facilitate their uptake.
- 2.1 To estimate the costs and potential contributions for each of the technologies falling into the "Assessment" category.
- 2.2 To ensure that the Government and industry learn quickly of any significant change in the prospects for each of the technologies that fall into the "watching brief" category.
- 3.1 To promote the development of internationally competitive industries to exploit the domestic and export markets for new and renewable energy technologies.
- 4.1 To identify and where possible quantify in monetary units the environmental impact of renewables.
- 4.2 To inform environmental policy making by quantifying the contribution to environmental improvements from the exploitation of new and renewable energy technologies.
- 5.1 To review the programme as a whole ensuring that Government, EC and industry have the best possible data against which to formulate policy and make plans.
- 5.2 Secure maximum benefit from collaboration with industry and with other programmes including those of the EC, IEA and EUREKA.

Appendix 5 .Results of the Evaluation Questionnaire

Number of Questionnaires Sent: **129**

Number of Questionnaires Received: **69**

Number of Usable Questionnaires: **62** (7 completely blank responses were received)

The Validity of the Questionnaire Results

When using the results from the questionnaire, it is important to be sure that any conclusions reached have a sound statistical basis. Using sampling theory, it is possible to establish how representative the responses from the 62 'usable' questionnaires are of the views of the 129 questionnaire recipients. If a 95% level of confidence is used, any results from the 62 'usable' questionnaires will correspond to the views of the 129 to within ten percentage points. For example, if over 60% of the 62 respondents said 'yes' to a particular question, it may be inferred that a majority of the 129 also hold this view (since the margin of error implies that between 50% and 70% of the 129 would say 'yes'). As in all inferences of this type, it must be remembered that the 62 are assumed to be a random sample of the 129 - if they are not (as is likely), the margin of error would be greater than ten percentage points.

The Questionnaire Results

The following table contains the percentage of responses to each question from the 'usable' questionnaires. Questions which required a comment only or a monetary valuation are not included in the table.

Percentage of 'Usable' Responses (Non-blank Questionnaires)
Questions which require a comment only or a monetary valuation are not included below.

QN:	PART	CODING	PERCENTAGE OF NON-BLANK QUESTIONNAIRES (i.e. OUT OF 62):			
A		RESPONDENT CHARACTERISTICS				
A4		How would you rate yourself in terms of each of the following categories. Please tick one box (Expert, Competent, Limited Knowledge and No Knowledge) against each category. 1. Encouraging the uptake of renewable technologies 2. Technology Assessment 3. Industrial Support 4. Environmental assessment of renewable technologies				
A4	1	1=EXP, 2=COMP, 3=LTD KNOW, 4=NO KNOW	35.48	38.71	17.74	1.61
	2	1=EXP, 2=COMP, 3=LTD KNOW, 4=NO KNOW	38.71	38.71	16.13	3.23
	3	1=EXP, 2=COMP, 3=LTD KNOW, 4=NO KNOW	17.74	45.16	22.58	4.84
	4	1=EXP, 2=COMP, 3=LTD KNOW, 4=NO KNOW	16.13	46.77	30.65	1.61
A5		Have you or has your company been involved with the programme? Please tick as appropriate (Yes or No).				
A5		1=YES; 2=NO	85.48	12.90		
A6		If you have been involved with the programme - have you had financial support under the programme? Please tick as appropriate (Yes or No).				
A6		1=YES; 2=NO	69.35	22.58		
A7		If you have been involved with the programme - is this as a user of the programme outputs? Please tick as appropriate (Yes or No).				
A7		1=YES; 2=NO	58.06	24.19		

PART	CODING	PERCENTAGE OF NON-BLANK QUESTIONNAIRES (i.e. OUT OF 62):	
QN:	PART	CODING	PERCENTAGE OF NON-BLANK QUESTIONNAIRES (i.e. OUT OF 62):

A8 What impact has the programme had on you or your organisation in stimulating activities which would otherwise not have occurred? have the following activities increased, stayed the same or decreased because of the programme activities?

1. R&D Activity
2. Useful Collaborations
3. Reduced Risk
4. Technical Development
5. Skill Levels
6. Industry Involvement
7. New Product
8. Technically Improved Product
9. More Competitive Product or Service
10. Increased Turnover
11. New Sales
12. Exports
13. Product Quality

			1	2	3	4
A8	1	1=INCR, 2=SAME, 3=DECR, 4=D KNOW	46.77	14.52	0.00	6.45
	2	1=INCR, 2=SAME, 3=DECR, 4=D KNOW	40.32	24.19	0.00	1.61
	3	1=INCR, 2=SAME, 3=DECR, 4=D KNOW	51.61	12.90	0.00	1.61
	4	1=INCR, 2=SAME, 3=DECR, 4=D KNOW	30.65	22.58	1.61	9.68
	5	1=INCR, 2=SAME, 3=DECR, 4=D KNOW	46.77	11.29	0.00	6.45
	6	1=INCR, 2=SAME, 3=DECR, 4=D KNOW	43.55	16.13	0.00	4.84
	7	1=INCR, 2=SAME, 3=DECR, 4=D KNOW	35.48	24.19	0.00	4.84
	8	1=INCR, 2=SAME, 3=DECR, 4=D KNOW	29.03	22.58	0.00	11.29
	9	1=INCR, 2=SAME, 3=DECR, 4=D KNOW	27.42	20.97	0.00	9.68
	10	1=INCR, 2=SAME, 3=DECR, 4=D KNOW	29.03	25.81	0.00	9.68
	11	1=INCR, 2=SAME, 3=DECR, 4=D KNOW	32.26	24.19	0.00	4.84
	12	1=INCR, 2=SAME, 3=DECR, 4=D KNOW	29.03	22.58	1.61	8.06
	13	1=INCR, 2=SAME, 3=DECR, 4=D KNOW	14.52	40.32	1.61	6.45

14	1=INCR, 2=SAME, 3=DECR, 4=D KNOW	27.42	27.42	0.00	8.06
A10	<p>If you have received financial support for a project with ETSU, what would have been the effect on the project if programme funding had not been available? Please tick one of the following categories:</p> <ol style="list-style-type: none"> 1. The project would have been pursued in full. 2. The project would have been pursued in part. 3. The project would not have been pursued. 4. Although this project may have been pursued, the overall number of projects by this company would have fallen. 				
A10	1=FULL, 2=PART, 3=NOT, 4=FALLEN	1 1.61	2 16.13	3 41.94	4 4.84

QN:	PART	CODING	PERCENTAGE OF NON-BLANK QUESTIONNAIRES (i.e. OUT OF 62):	
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QN:	PART	CODING	PERCENTAGE OF NON-BLANK QUESTIONNAIRES (i.e. OUT OF 62):	
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A11	<p>Please answer the following two categories with respect to the categories below:</p> <ol style="list-style-type: none"> a. in what ways have you used the programme b. was it beneficial <ol style="list-style-type: none"> 1. Has your company received an ETSU publication? 2. Has your company attended an ETSU event? <p>Has ETSU provided advice to do with:</p> <ol style="list-style-type: none"> 3. the NFFO 4. EC funding 5. technical assessment 6. environmental assessment 7. planning questions 8. financing questions 			
A11a	1	1=YES, 2=NO	88.71	1.61
	2	1=YES, 2=NO	82.26	8.06
	3	1=YES, 2=NO	33.87	50.00
	4	1=YES, 2=NO	51.61	35.48
	5	1=YES, 2=NO	35.48	48.39
	6	1=YES, 2=NO	22.58	61.29
	7	1=YES, 2=NO	19.35	66.13
	8	1=YES, 2=NO	22.58	61.29
A11b	1	1=YES, 2=NO	88.71	0.00
	2	1=YES, 2=NO	80.65	3.23
	3	1=YES, 2=NO	30.65	14.52
	4	1=YES, 2=NO	40.32	19.35
	5	1=YES, 2=NO	35.48	20.97
	6	1=YES, 2=NO	24.19	25.81
	7	1=YES, 2=NO	20.97	27.42
	8	1=YES, 2=NO	20.97	29.03

A12	Did you contact ETSU directly for information? Please tick as appropriate (Yes or No).	1	2	
A12	1=YES, 2=NO	70.97	12.90	
A13	Did ETSU make the first contact with you? Please tick as appropriate (Yes or No).	1	2	
A13	1=YES, 2=NO	29.03	50.00	
B	MARKET ENABLEMENT			
B1	Has the programme helped reduce the risk to you of entering the renewable energy industry? Please tick as appropriate (Yes, No or N/A).	1	2	3
B1	1=YES, 2=NO, 3=NOT APPLIC.	35.48	16.13	45.16

QN:	PART	CODING	PERCENTAGE OF NON-BLANK QUESTIONNAIRES (i.e. OUT OF 62):		
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QN:	PART	CODING	PERCENTAGE OF NON-BLANK QUESTIONNAIRES (i.e. OUT OF 62):		
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B2		Has the programme helped you to overcome non-technical barriers to your involvement in the renewable energy industry? Please tick as appropriate (yes, No or N/A). If yes: please delete as appropriate Yes or No: 1. lack of understanding of renewables at management levels 2. lack of acceptance of renewables within financial circles 3. unclear planning guidelines for local authorities 4. lack of acceptance by electricity companies as a result of an unclear understanding of the impact of renewables on the electricity system.	1	2	3
B2	*	1=YES, 2=NO, 3=NOT APPLIC.	37.10	25.81	33.87
	1	1=YES, 2=NO	69.6	17.4	
	2	1=YES, 2=NO	56.5	26.1	
	3	1=YES, 2=NO	30.4	43.5	
	4	1=YES, 2=NO	30.4	52.2	
B3		has the activity helped you to become involved in renewables energy deployment via the NFFO? Please tick as appropriate (Yes, No or N/A).	1	2	3
B3		1=YES, 2=NO, 3=NOT APPLIC.	27.42	29.03	37.10
B4		Has the activity helped you to become involved in renewable energy deployment by green trading arrangements? Please tick as appropriate (Yes, No or N/A).	1	2	3
B4		1=YES, 2=NO, 3=NOT APPLIC.	8.06	38.71	45.16

B5		Has the programme provided you with easy-access information when you needed it? Please tick as appropriate (Yes, No or N/A).	1	2	3
B5		1=YES, 2=NO, 3=NOT APPLIC.	61.29	11.29	16.13
			1	2	3
B6	1	1=YES, 2=NO, 3=NOT APPLIC.	56.45	9.68	22.58
	2	1=YES, 2=NO	31.4	34.3	
	3	1=YES, 2=NO	40	28.6	
	4	1=YES, 2=NO	45.7	31.4	
	5	1=YES, 2=NO	25.7	34.3	
	6	1=YES, 2=NO	22.9	42.9	
	7	1=YES, 2=NO	68.6	8.6	
B7		Do you know of any spin-off companies that have been formed as a result of the programme? Please tick as appropriate (Yes, No or N/A).	1	2	3
B7		1=YES, 2=NO, 3=NOT APPLIC.	12.90	58.06	19.35

QN:	PART	CODING	PERCENTAGE OF NON-BLANK QUESTIONNAIRES (i.e. OUT OF 62):		
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QN:	PART	CODING	PERCENTAGE OF NON-BLANK QUESTIONNAIRES (i.e. OUT OF 62):		
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B8		Has the programme been successful in helping you to increase your presence in the renewable energy industry, thereby ultimately leading to a higher deployment rate? Please tick as appropriate (Yes, No or N/A).	1	2	3
B8		1=YES, 2=NO, 3=NOT APPLIC.	43.55	20.97	22.58

B9		Do you consider that the market enablement programme has failed to pursue or accomplish an essential point? Please tick as appropriate (Yes, No or N/A).	1	2	3
B9		1= YES, 2=NO, 3=NOT APPLIC.	32.26	32.26	25.81

C TECHNOLOGY ASSESSMENT

C1		Have you been involved with this activity? Please tick as appropriate (Yes, No or N/A). If No, please go to Section D.	1	2	3
C1		1=YES, 2=NO, 3=NOT APPLIC.	43.55	40.32	9.68

C2		In your opinion, how well has the activity pursued the task of estimating the costs and potential contributions of the new and renewable energy technology you are familiar with? Please tick one box between 1 and 5 or the Don't Know box, where 1 represents the best possible assessment and 5 represents the worst possible assessment. Please indicate which technology or technologies this assessment relates to.	1	2	3	4	5	6
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C2 1-5=OPINION, 6=DONT KNOW 7.4 40.7 29.6 18.5 7.4 22.2

C3 In your opinion, how well has the programme ensured that Government and industry learn quickly of any significant change in the prospects of the new and renewable energy technologies that you are familiar with? Please tick one box between 1 and 5 or the Don't Know box, where 1 represents the best possible assessment and 5 represents the worst possible assessment. Please indicate which technology or technologies this assessment relates to.

C3 1-5=OPINION, 6=DONT KNOW 1 2 3 4 5 6
11.1 18.5 33.3 25.9 3.7 25.9

D INDUSTRIAL SUPPORT

D1 Has the programme helped you to exploit the domestic renewable energy market? Please tick as appropriate (Yes, No or N/A).

D1 1= YES, 2=NO, 3=NOT APPLIC. 1 2 3
29.03 32.26 32.26

D2 Has the programme helped you to find and develop an export market? Please tick as appropriate (Yes, No or N/A).

D2 1= YES, 2=NO, 3=NOT APPLIC. 1 2 3
19.35 37.10 30.65

QN: PART CODING PERCENTAGE OF NON-BLANK QUESTIONNAIRES (i.e. OUT OF 62):

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D3 Has the programme helped you to become more internationally competitive? Please tick as appropriate (Yes, No or N/A).

D3 1= YES, 2=NO, 3=NOT APPLIC. 1 2 3
19.35 29.03 41.94

D4 Has programme funding enabled you or your organisation to develop technologies which now hold patents. Please tick as appropriate (Yes, No or N/A).

D4 1 2 3
8.06 46.77 35.48

D5 Do you consider that there have been particular successes of the industrial support activity? Please tick as appropriate (Yes, No or N/A).

D5 1= YES, 2=NO, 3=NOT APPLIC. 1 2 3
25.81 20.97 33.87

D6 Do you consider that there have been particular omissions of the programme? Please tick as appropriate (Yes, No or N/A).

D6 1= YES, 2=NO, 3=NOT APPLIC. 1 2 3
35.48 20.97 20.97

E ENVIRONMENTAL ASSESSMENT

E1 Has the environmental assessment activity been of benefit to you? Please tick as appropriate (Yes, No or N/A). If no, please go to Section F.

E1 1 2 3
22.58 32.26 35.48

E2	Has the activity informed you of the contribution to environmental improvements from the exploitation of new and renewable energy technologies? Please tick as appropriate (Yes, No or N/A).	1	2	3
E2	1=YES, 2=NO, 3=NOT APPLIC.	25.81	16.13	12.90
E3	Do you consider that there have been particular omissions of the environmental assessment activity? Please tick as appropriate (Yes, No or N/A).			
E3	1=YES, 2=NO, 3=NOT APPLIC.	1	2	3
F	PROGRAMME MANAGEMENT	16.13	24.19	11.29
F1	As a result of your experience of the programme, how would you assess the project management on behalf of the DTI? Please tick one box between 1 and 5 or the Don't Know box, where 1 represents the best possible assessment and 5 represents the worst possible assessment. 1. The ability of ETSU to choose appropriate projects 2. The transference of information gathered through the programme to the public domain 3. Response to your needs through accessible staff.			

QN:	PART	CODING	PERCENTAGE OF NON-BLANK QUESTIONNAIRES (i.e. OUT OF 62):					
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F1	1	1-5=OPINION, 6=DONT KNOW	1	2	3	4	5	6
	2	1-5=OPINION, 6=DONT KNOW	11.29	33.87	22.58	8.06	1.61	16.13
	3	1-5=OPINION, 6=DONT KNOW	8.06	37.10	17.74	9.68	4.84	16.13
			25.81	32.26	24.19	3.23	0.00	8.06
F2		From your experience, has ETSU brought any particular skills or advantages to managing the programme? Please tick as appropriate (See comments below or Don't Know).						
F2		1=COMMENT, 2=DONT KNOW	1	2				
			56.45	22.58				
F3		From your experience, what essential points within the New and Renewable area have ETSU failed to pursue or accomplish? Please tick as appropriate (See comments below or Don't Know).						
F3		1=COMMENT, 2=DONT KNOW	1	2				
			54.84	27.42				
F4		From your experience, are there difficulties in ETSU managing the programme for the DTI? Please tick box as appropriate (See comment or Don't Know).						
F4		1=COMMENT, 2=DONT KNOW	1	2				
			67.74	24.19				
G		PROGRAMME OBJECTIVES						
G1		Future Improvements - do you think there is a strong case for the programme to continue? Please tick as appropriate (Yes, No, Don't Know).						
G1		1=YES, 2=NO, 3=DONT KNOW	1	2	3			
			85.48	1.61	6.45			

G2	If yes to G1, should the programme continue to focus on the same objectives? Please tick as appropriate (Yes, No, Don't Know).			
G2	1=YES, 2=NO, 3=DONT KNOW	1 64	2 22.6	3 17
G3	If you think the current programme objectives are more or less appropriate, should their relative weighting within the programme change or become clearer? Please tick as appropriate (Yes, No, Don't Know).			
G3	1=YES, 2=NO, 3=DONT KNOW	1 38.71	2 16.13	3 14.52
G4	If there are any other comments you wish to make, please do so below.			
