NEW & RENEWABLE ENERGY

Prospects for the 21st Century

ANALYSIS OF THE RESPONSES TO THE CONSULTATION PAPER

JULY 1999

dti
Department of Trade and Industry

CONTENTS

The summary views expressed in this analysis are solely those of respondents to the consultation exercise, and do not necessarily accurately reflect existing or anticipated Government policies.

INTRODUCTION

BACKGROUND

1 The Government's Consultation Document New and Renewable Energy: Prospects for the 21st Century was published in March 1999. It was widely distributed to companies, organisations and interested private individuals throughout the UK.

2 Views were invited on the document and on the issues raised. Almost 260 responses were received and analysed. This report summarises the findings of that analysis.

REPORT STRUCTURE

3 This report is structured in five sections. Section 2 focuses on respondents' views on the reasons for supporting renewables. It considers the contribution of renewables to climate change initiatives; it assesses views about the narrow focus on electricity from renewable sources; it examines the relationship of renewables development to other Government strategies; and it considers the role of nuclear energy within the overall energy context.

4 Section 3 examines respondents' views on the various renewable energy support options and issues considered in the Consultation Document. These cover a wide range of topics, including the NFFO mechanism and its possible successor; technology choice for the future; the obligation issue; the 'green electricity' market; embedded generation; the review of electricity trading arrangements; the planning process; educating and informing the public; research and development issues; grant aid; tax incentives; and the Climate Change Levy.

5 Section 4 focuses on future policy option issues. It considers the whole question of targets for electricity generated from renewable sources; examines ways of stimulating the UK renewables industry; assesses the UK approach within the international context; and summarises respondents' preferred policy options for the future.

6 Section 5 summarises the perceived importance and potential for development of each of the main renewable energy technologies examined in the Consultation Document's Supporting Analysis.

7 Section 6 summarises the main findings of the consultation.

THE RESPONDENTS

8 Respondents can be categorised broadly into eight different groups (Fig 1).

9 The conventional energy sector included major generators, the National Grid Company, fuel providers, public electricity supply companies from all parts of the UK, trade associations, and local energy agencies.

10 The renewable energy sector included generators, the Non-Fossil Purchasing Agency, development, design and construction companies, equipment manufacturers, renewable energy trade associations and consultants in the renewables field.

11 Those countryside/environmental organisations that responded to the Consultation Document ranged from large national bodies such as the National Trust to local countryside protection groups from, for instance, Scotland, Cornwall, Mid-Wales and the Lake District.

12 The group categorised as 'other' contained respondents from a wide range of organisations, including trade unions, professional institutions, the CBI and the Institute of Directors, water companies and independent consultants.

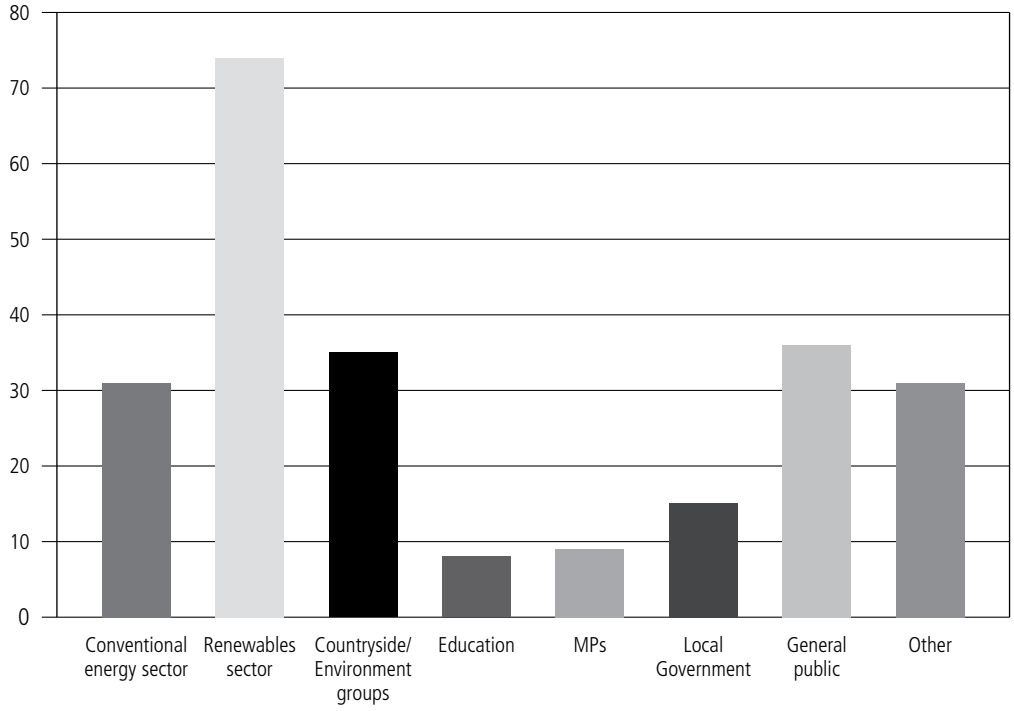

Fig.1: Number of respondents in each category
(excludes acknowledgements, drafts etc)

ISSUES RELATING TO SUPPORT FOR RENEWABLES

CONTRIBUTION TO CLIMATE CHANGE INITIATIVES

13 Most respondents overtly or tacitly accept the importance of climate change and agree that the development of renewable energy is an important component of the Government's initiatives in this field. There is, however, a small body of opinion that either remains unconvinced about the climate change issue or perceives that the levels of renewable energy development envisaged will have little or no effect on the problem.

SECTION 2

A TOO NARROW FOCUS ON ELECTRICITY

14 About 20% of respondents from every area of interest expressed concern that the Consultation Document has not kept the UK more in line with Europe by giving a higher profile to the use of renewable energy for heating, transportation, combined heat and power (CHP), and non-network connected electricity.

15 It is clearly felt that there should be stronger and more effective support for renewable energy heating technologies, particularly domestic solar water heating, passive solar design and biomass heating.

16 Renewable energy transport issues raised include the perceived potential of biodiesel and the need for policies that will reduce carbon dioxide (CO_2) emissions from transport, promote electric vehicles and address new fuels and propulsion systems.

17 Several respondents highlight the need for strong support for CHP initiatives within the renewables sector, while others have focused on the opportunities for renewables-based community heating.

RELATIONSHIP OF RENEWABLES DEVELOPMENT TO OTHER GOVERNMENT STRATEGIES

18 Both energy efficiency and demand reduction options are perceived to be at least as important as renewable energy in meeting environmental commitments. There is concern at the Consultation Document's apparent lack of recognition of this fact*, and numerous respondents have called on the Government to give greater consideration to both areas of activity. Several reasons are given:

- energy efficiency and demand reduction measures are likely to be less costly than investment in renewable energy, and also more effective in reducing CO_2 emissions;
- focusing solely on renewable energy will encourage demand to go on rising;
- a combination of measures is more likely to be sustainable in the longer term: it is also more likely to encourage public support for renewables.

* In fact paragraph 21 of the consultation document advises that a climate change programme would comprise a portfolio of measures including fuel switching, combined heat and power and energy efficiency as well as renewables.

19 There is a clear belief that the Government should adopt a more holistic approach and should assess and develop renewable energy options within the context of a wider energy and environmental strategy. Furthermore, renewable energy initiatives should be consistent with other Government initiatives in the planning and electricity sectors.

THE ROLE OF NUCLEAR ENERGY

20 Several respondents believe that nuclear energy should remain a component of the UK energy mix because its CO_2 emissions are virtually zero. There is concern that two-thirds of the country's nuclear plant will have reached the end of its useful life by 2012. It is recognised that electricity from renewable sources will replace only a fraction of that lost by the closure of nuclear power stations and that CO_2 emissions are almost bound to rise as the use of fossil fuels increases. Perceived options include the more efficient use of fossil fuels for power generation, a significant improvement in energy efficiency levels and the construction of replacement non-carbon emitting plant, including nuclear plant. However, it is recognised that, for new nuclear power stations to become a feasible option, certain important issues will need to be resolved, notably:

- the disposal of nuclear waste in an agreed and acceptable manner;
- the financing of new nuclear plant within the privatised generation industry;
- the provision of an even-handed planning system;
- appropriate provision for nuclear research.

21 A handful of respondents have expressed their belief that nuclear energy should pay fully for all its external costs, and that any nuclear R&D funding should be switched to the renewables sector.

VIEWS ON RENEWABLE ENERGY SUPPORT OPTIONS

NFFO AND RELATED FINANCIAL ISSUES

INTRODUCTION

22 About half of all respondents have given specific consideration to the options for supporting the generation of electricity from renewable sources. Their views vary widely. A limited number of respondents favour competition as the way forward; others foresee a need for extensive support initiatives; a third group recognises a need for a mixture of prescription and competition. The following paragraphs examine the views of respondents on a range of issues on this topic.

PERCEPTIONS OF THE NFFO MECHANISM - SUCCESS OR FAILURE?

23 A few respondents have noted certain successes achieved under the existing Non-Fossil Fuel Obligation (NFFO) mechanism - the reduction in the price of electricity generated from renewable sources, the increase in renewable energy generating capacity, and the perceived environmental and cost-effective nature of development.

24 A rather larger number of respondents (10% of the total) have highlighted perceived problems and failures:

- the narrow focus on cost-competitiveness that has driven developers to target the most technically advantageous - and often most contentious - sites;
- the high up-front costs involved in making a bid that have penalised smaller development businesses;
- the driving down of costs that has made it difficult for UK industries to compete;
- a poor implementation record and a failure to allow for some degree of non-delivery in the contracts awarded;
- inadequate longer-term support for renewables, particularly emerging technologies;
- the intermittent nature of the bidding process that has discouraged some larger energy/utility companies and provided problems for planners.

A NEW NFFO MECHANISM?

25 More than 50 respondents have specifically expressed or implied a preference for continuing with NFFO or a NFFO-type arrangement as a means of bringing forward new renewable generating capacity and ensuring technology development, at least in the medium term. The majority of these respondents - and those most positively in favour - come from the existing electricity industry, the renewables sector and countryside/environmental groups. No single format is suggested. Some believe that an obligation alone will be adequate, with suppliers contracting with renewable energy generators either directly or through the equivalent of a Non-Fossil Purchasing Agency. Others perceive the need for a long-term

contract mechanism very similar to the existing one. A few respondents have suggested that support should be for selected technologies only, eg those that are not close to price convergence. There is also a view that the scope of any new mechanism should be broader in terms of technology and scale, and that it should provide opportunities both for new technologies and for the development of smaller-scale and more community-based projects. Some of these issues are explored below.

FOSSIL FUEL TYPE LEVY

26 Apart from one response which suggests that the Levy falsely implied more support for renewable energy than for conventional generation, those considering this issue are in favour of using the Levy, either alone or in combination with other forms of support, as a means of funding the generation of electricity from renewable sources.

THE FUTURE OF EXISTING NFFO CONTRACTS

27 The clear message is that existing NFFO contracts should be honoured and not disadvantaged in any way, including those at various stages of the planning process. Specific suggestions include retaining the current structure; incorporating existing contracts in the new system; and allowing projects that cannot obtain planning permission to switch to new sites.

IMPROVING THE TIMING AND CONSISTENCY OF A NFFO-TYPE SUPPORT MECHANISM

28 There have been several proposals for improving the timing and consistency of a NFFO-type support mechanism, including:

- a known and ordered programme of development to encourage efficient business planning;
- a continuous rolling programme/open bidding, with bid prices regularly adjusted, or a regular programme with bids every six to 12 months;
- continued competition to encourage innovation and a least-cost approach;
- the continuation of technology bands that would allow support for less developed technologies and smaller projects, both of which would be more expensive;
- greater flexibility by ensuring that contracts were less site-specific.

SECTION 3

THE 'GREENING' OF A NFFO-TYPE MECHANISM

29 Several respondents have indicated that any revised NFFO should give greater consideration to the potential environmental impacts of projects at the time contracts are awarded, including cumulative impacts. This might be linked to a more robust and informed 'will secure' test. Suggestions include:

- independent environmental statements for all proposed developments;
- awarding contracts on the basis of environmental costs as well as bid price;
- the delineation of zones where planning consent is likely to be granted.

30 An extension of this view is that NFFO contracts should be tied in with the planning process, with funding going only to projects that have already achieved at least outline planning permission, if not full consent. This, again, could be linked to the 'will secure' test.

TECHNOLOGY CHOICE FOR THE FUTURE

31 Where comments on the technologies to be supported have been NFFO-specific, the overriding view has been that any successor to NFFO must look beyond near-term and near-commercial activities and give realistic and long-term support to a range of new and developing technologies that might not otherwise be supported in the market place.

32 Where responses have not been NFFO-specific, views have ranged from priority support for those technologies most likely to be successful to support for all technologies. Again, in the majority of cases, the importance of moving beyond the existing range of technologies has been stressed. This might include using methane from coal mines on the grounds that it is more environmentally friendly to convert this damaging greenhouse gas to CO_2. There was also a widespread perception that more support should be given to heat-producing renewables projects and to CHP systems.

33 Some concern is expressed about new and renewable technologies that are based on combustion and emit significant quantities of CO_2 to the atmosphere.

THE SCALE OF FUTURE RENEWABLES INITIATIVES

34 Whether or not the comments have been NFFO-specific, there have been numerous calls for a more balanced approach that permits the development of small-scale community-based projects as well as conventional large-scale schemes. Small-scale schemes are perceived to offer certain advantages:

- better public understanding and less opposition to renewable energy development;
- the development of more of the resource over a wider geographical area;
- a reduction in transmission losses where power is both generated and used locally;
- greater environmental acceptability.

TIME OF DAY/SEASON OF YEAR ISSUES

35 A few respondents have suggested that further consideration should be given to issuing contracts incorporating time of day and/or season of year conditions.

THE OBLIGATION ISSUE

36 More than 20% of respondents addressed the obligation issue, by far the majority indicating that the obligation to supply electricity generated from renewable sources should lie with suppliers. The three opposing views, two of them from Public Electricity Suppliers (PESs), are concerned that this will distort the market or prove too costly. Where respondents have selected one of the three supplier obligation options given in the Consultation Document, ten have chosen Option A and

eight have selected Option C as their preferred choice or the nearest they could approach to it. Of 21 respondents that did not select any particular option, six have specified that there should be a trading component to the obligation, while three have specified that the obligation should apply to a mix of technologies or to defined resources, including CHP and electricity generated via fuel cells.

37 Twenty-five respondents specified that any obligation should apply to all suppliers. The same message was implied in other responses although a few provisos were also given, including special terms for those entering or leaving the market, exemption for suppliers below a certain size, and exemption for suppliers selling more than a certain (high) proportion of their electricity from renewable sources.

38 Seven respondents have selected Option E (obligation on distributors). Only two believe that any obligation should lie with generators.

39 Most people feel that the obligation should be in terms of output rather than capacity. One PES prefers an obligation based on capacity but with payment based on metered output - an approach believed to be more likely to result in the use of proven technologies to meet obligations.

OPERATING A 'GREEN ELECTRICITY' MARKET

40 Development of a 'green electricity' market is perceived to have been hindered by the limited amount of ex- or non-NFFO capacity available, by low energy prices and by customer reluctance to pay a premium for electricity from renewable sources. Progress will require positive encouragement, for example:

- public sector purchasing of green electricity to set an example;
- new legislation to facilitate local trading in green electricity;
- fairer connection/metering to encourage own generation with sales of surpluses;
- Government promotion of green electricity, eg by varying VAT rates;
- reducing generator technology prices to encourage renewable energy development.

41 Some respondents find the concept of a green electricity market unacceptable:

- More costly green electricity suggests that renewable energy is an expensive luxury.
- Limiting support to the dedicated will restrict renewable energy development.
- The poorer members of society will be unable to 'do their bit' for the environment.
- Obligation is a better approach as it spreads the cost over all customers.

RENEWABLE ENERGY ACCREDITATION

42 Renewable energy accreditation is perceived to be important. Although several respondents have assumed that the Energy Saving Trust's accreditation scheme will automatically be used, others suggest that certification should be by an independent non-government organisation or be subject to Government overview/audit.

THE EMBEDDED GENERATION ISSUE

43 Respondents demonstrate a continuum of points of view on the issue of embedded generation. A number of views from countryside, environmental and renewable energy industry bodies have highlighted concerns about connection costs, discriminatory pricing, and lack of encouragement from distribution companies.

44 At the other end of the spectrum, the PESs in particular argue that embedded generation can create difficulties, especially in relation to network stability, the identification of suitable connection points, and the management of intermittent supplies. As a result, it is necessary to introduce more sophisticated controls, network reinforcement, power conditioning, load-following plant etc. Despite their concern about these issues, several of the PESs accept that renewable generators should be able to participate fairly and that there is a need for further independent study of all the issues involved.

45 Those occupying the middle ground believe that there is room for improvement. They recommend a transparent and non-discriminatory system that takes into account both benefits and costs.

REVIEW OF ELECTRICITY TRADING ARRANGEMENTS

46 Only one respondent, a member of the general public, has expressed outright approval of current Review of Electricity Trading Arrangements (RETA) proposals in the hope that they will stop the rush to develop wind energy. The other responses to this issue range from a recognition that the proposals will favour generators with a predictable and controllable output, particularly the larger conventional generation companies, through concern at the likely adverse impact on electricity generation from renewable sources, to an insistence that generation from renewable sources and/or CHP must not be disadvantaged, but positively encouraged.

47 On the issue of balancing charges, two respondents have suggested that balancing charges should be spread across the whole market. Yet, while RETA is clearly creating uncertainty, it is believed that the proposed market changes also present an opportunity for developing a framework for the development of both renewable energy and CHP.

RESEARCH AND DEVELOPMENT ISSUES

48 There is widespread support across the board for an appropriate programme of renewable energy research and development to meet the needs of Government and industry. Research and development is perceived to be important if the UK renewable energy industry is to compete in the international market in the longer term. It is also noted that those countries that have benefited from renewable energy technologies in terms of wealth and job creation are the ones in which Governments have invested in R&D and in the development of the home market.

49 Most of those addressing the R&D technology issue believe that the focus should be on new, immature or longer-term technologies, the latter being brought to the point at which they can enter the market place. Particular emphasis has been placed on R&D into offshore technologies (wind, wave, tidal barrages and tidal stream), biofuels, active solar energy and PV, fuel cells and hydrogen, geothermal energy, and single-unit wind and solar projects.

There is also a strongly held view that R&D should extend beyond technical concerns to assessment and mitigation of the environmental impacts of renewable energy development.

50 The necessary level of funding is perceived to be more substantial than that suggested in the Consultation Document. Funding suggestions include the Climate Change Levy, European funding sources, an extended Fossil Fuel-type levy and a broader application of the Landfill Tax.

GRANT AID

51 Direct grants should be one component in the provision of financial assistance for renewable energy. Suggestions for their use include market stimulation; the offsetting of high start-up costs; encouragement for small-scale private-sector development; stimulation for pilot and demonstration plants.

TAX INCENTIVES

52 Several respondents have highlighted the need to reduce or eliminate VAT on green electricity and renewable energy equipment. Other tax-related suggestions include more tax exemptions/ tax incentives for renewable energy development; the inconsistency of not taxing aviation fuel but fully taxing biodiesel and similar fuels; and the inconsistency of applying energy taxes to business electricity but not to business use of gas or other fossil fuel energy sources.

CLIMATE CHANGE LEVY

53 Most of those commenting on the Climate Change Levy are against its imposition on electricity from renewable sources, some adding the rider that exemption should depend on the electricity's provenance being verifiable via an approved accreditation scheme. Three respondents are in favour of the levy. Several others have suggested that it should be replaced by a carbon tax.

54 A considerable number of respondents expect the money raised by the levy to be used to increase support for renewable energy schemes and thereby stimulate the demand for green electricity. Several perceive the £50 million earmarked for renewable energy and energy efficiency to be inadequate.

ENVIRONMENTAL AND LIFE-CYCLE COSTING

55 The growing importance of life-cycle costing has been recognised, although it is perceived that the electricity market is still being designed around the needs of the large conventional generators and ignores environmental externalities. There is also recognition that the renewable energy industry itself is not without its environmental costs, and these should also be taken into account. Several respondents have called for the full environment impact assessment of all technologies over the whole life-cycle of those technologies at every stage in the development process.

DISCOUNT RATES

56 The use of 8% and 15% discount rates has been criticised. These are felt to be too high given the present cost of capital, penalising those technologies with high up-front costs and low recurrent costs.

WIDER SUPPORT ISSUES

THE PLANNING PROCESS

57 Nearly 45% of respondents have commented on issues relating to the planning process. Some perceive the process to be a barrier to the development of renewable energy in the UK; others highlight the need for a review to restore order to the process; a third group indicates that Government should make sure that Regional and Local Planning Authorities recognise the importance of renewable and sustainable energy development in meeting key UK and international environmental policy commitments.

58 Possible ways forward focus on providing planning authorities with better guidance and information. This could involve:

- redrafting Planning Policy Guidelines to give positive indications of the relevant requirements;
- accompanying these Guidelines by objective information, case history material and examples of best practice.

Other suggestions include:

- strategic energy planning at national, regional and local level;
- the inclusion of renewable energy development within Structural and Local Plans;
- regional/local targets for development;
- the identification of areas suitable for development;
- greater consideration of cumulative impact;
- decisions to be given within a limited time period;
- decisions by Planning Inspectors to be consistent and impartial.

59 Several respondents, many of them members of the public or countryside/environmental groups, have expressed concern over the implication that planning objections are wrong and that the DTI/DETR will seek to change planning law to force local planners to make presumptions in favour of renewable energy.

EDUCATING AND INFORMING THE PUBLIC

60 More than 20% of respondents have highlighted the importance of educating the public - and planning officials and elected members - about climate change and its consequences, and about the roles of renewable energy and energy efficiency in combating this phenomenon, ensuring that targets are met and countering the spread of misinformation where it arises. There is also a clear perception that public awareness and response improves when people are involved in projects, particularly at the local level, and that this should be encouraged.

61 Suggested initiatives include the provision of a national network of impartial and independent advice outlets/Energy Management Agencies; making renewable energy development a central feature of local Agenda 21 initiatives; technology demonstrations at the local level; green labelling and accreditation schemes; more input to schools; and a joint Government/industry marketing campaign to 'sell' appropriate technologies to the building industry, property developers and the public.

POLICIES FOR THE FUTURE

TARGETS

62 Most respondents express satisfaction that the Government is taking renewable energy seriously and agree that renewable energy has an important role to play in meeting climate change targets. Their views vary widely on the Government's target of working towards providing 10% of UK electricity supplies from renewable sources as soon as possible, and hoping to achieve this by 2010. Most welcome or support the target or believe that the target should be set at a more challenging level. There is also considerable support for a longer-term view to maintain the momentum after 2010 when additional CO_2 emission reductions can be expected.

63 At the other end of the spectrum are those who feel that the Government is not taking its 10% target seriously, often referring to it as an aim rather than a target. There are also those who believe the 10% target to be over ambitious given current planning and financial constraints and the limited level of development achieved to date. There was support for the setting of regional targets to help ensure the effective take-up of renewables.

STIMULATING UK RENEWABLES INDUSTRIES

64 Despite some growth in the generation of energy from renewable sources in recent years, the UK industry supporting the renewables sector is not currently seen as capable of meeting the development requirements associated with the Government's 10% target. The industry is perceived to be small and fragmented: the wind industry in particular has been disadvantaged by the NFFO mechanism, while the solar sector has suffered a blow with BP moving all its solar manufacturing facilities to locations outside the UK.

65 Respondents highlight the need to promote a thriving renewable energy business in the UK, with the development of a strong, stable and predictable UK market the first step in this process. A thriving home market is expected to encourage the right environment for industry development and provide a platform for export success. Suggested ways in which Government can stimulate the process include support for technology R&D and demonstrations; cross-industry collaboration; clear targets and planning and development conditions; Government investment in UK manufacturing; assistance for SMEs in accessing funding; and support for those seeking to enter the export market.

INTERNATIONAL CONSIDERATIONS

66 A number of respondents are concerned that the UK should be more in line with Europe in its approach to renewable energy. This applies to targets (of the UK's target for electricity only as against the EU target for 12% of all primary energy from renewable sources), a single renewable energy market, and funding and support initiatives. There is a view that the UK can learn from experience elsewhere as well as contribute to international emissions reduction targets and participate in the international market.

THE RENEWABLE ENERGY TECHNOLOGIES

ADVANCED FUEL CELLS

68 Fuel cells are expected to play an important role in emissions reduction and in distributed electricity applications and transport. There are calls for more R&D and for Government to encourage fuel cell deployment at the local and domestic scale.

AGRICULTURAL AND FORESTRY WASTES AND ENERGY CROPS

69 Several respondents have highlighted the benefits of biomass in terms of its sustainability, potential for local jobs and economic development, and suitability for small-scale as well as large-scale initiatives. At the same time there is some concern over emissions, along with the suggestion that more attention should be paid, in the case of wastes, to the potential for anaerobic digestion.

70 13 of the 18 respondents considering the specific issue of energy crops support their development. Several have stressed the need to develop some form of national energy crops strategy incorporating a range of possible components including R&D, establishment grants and support payments, a conversion scheme for grassland, and encouragement for crops used to produce biodiesel. However, support is tempered by provisos, including the need to avoid monoculture, to control the scale of planting, and to recognise the non-sustainable inputs (fertilisers, fuel etc) to production.

SMALL-SCALE HYDRO POWER

71 Several respondents recommend continued support and encouragement for small-scale hydro power, including the development of former water mill sites. The advantages of this approach are perceived to be the potential for exploiting more of the total resource and encouraging off-grid power generation, and the value of small-scale developments in educating people about the need for and the importance of renewable energy. Reservations include fluctuating output, possible landscape and environmental impact, the need for a three-phase power supply, and the lack of a simple, secure market place.

LANDFILL GAS

72 Of the 9 respondents commenting on landfill gas, 6 supported its use on the basis that, although landfill gas emits carbon dioxide to the atmosphere, this is less damaging than letting its methane content escape. The technology is capable of competing with conventional electricity generation without price support and, although two respondents registered their disapproval of landfill as a means of waste disposal, there are calls for continued support for landfill gas technology where appropriate.

MUNICIPAL SOLID WASTE COMBUSTION

73 Organisations involved in the municipal solid waste combustion industry have highlighted the importance of this technology if the Government is to meet its 10% target. The technology is perceived to be mature, emissions are below those for coal-fired generating plant, and the potential exists for at

least 1000 MW of energy. However, planning problems have limited the conversion of NFFO contracts into actual projects and there is concern that the Government is being tempted away from waste combustion, despite the fact that it is viable and competitive without price support.

74 Those outside the industry are concerned that waste combustion is neither carbon-neutral nor renewable. There are calls for greater attention to be paid to waste minimisation, recycling and sustainable waste management, with combustion as a last resort. More consideration should also be given to the anaerobic digestion of waste.

SOLAR ENERGY

75 Support for using solar energy in one form or another is common to many respondents, although one PES highlighted the problems created for network management and the increase in costs associated with this intermittent energy source.

76 There is concern within the ***active solar*** industry and amongst environmental groups that the Government has missed an opportunity to achieve avoided CO_2 emissions by not emphasising solar thermal applications in the Consultation Document. The technology is perceived to be proven and to offer enormous potential, not just in the export market. Countries with a climate similar to that of the UK are vigorously and successfully implementing solar heating technologies, and much of the UK demand for low-grade domestic heat could be met in this way. The industry is calling for an imaginative market stimulation programme.

77 ***Passive solar design*** is recognised as an effective method of reducing CO_2 emissions. It is perceived to be one of the few technologies that does not encounter opposition to its development, and there are calls for the revision of building and/or planning regulations and for appropriate guidance to be produced to maximise the application of this technique.

78 The majority of respondents on the topic of ***photovoltaics*** (28 out of 32), most of whom are from the renewables sector or environmental/ countryside bodies, believe that PV offers enormous potential and that the Government is wrong to regard PV as a long-term technology. Other countries have recognised and are developing the potential of this technology, and the UK is likely to be left behind if it does not follow suit. Building-integrated PV is perceived to be mature technology and to be cost-effective in a growing number of applications - more so than indicated in the Consultation Document's Supporting Analysis because of perceived inaccuracies in the figures quoted for the avoided cost of cladding.

79 Suggestions as to the way forward include a marketing campaign to 'sell' PV to the building industry, property developers and the public; the installation of building-integrated PV in at least a proportion of new houses; the construction of large, prestige 'landmark' projects; grants to the PV industry and for individual household installations; simplified grid connections; and further technology development. A co-ordinated initiative on a sufficient scale is expected to encourage development within the industry, reduce prices and stimulate further take-up of the technology.

80 Cautionary notes include the high capital costs and low efficiencies of PV systems, and a lack of sustainability associated with the use of rare metals.

TIDAL STREAM

81 Several respondents have expressed concern that the Government is adopting too negative an approach to tidal stream technology. It is perceived as a predictable and reliable source of power that uses existing equipment and construction methods and is likely to be cost-competitive after the first project. There are calls for Government support for an initial study and demonstration, and also for continued R&D.

WAVE POWER

82 There is considerable support (27 out of 33 respondents) for the development of wave power. There are recommendations for wave power to be considered as a medium term technology. There is also concern that the country is failing to capitalise both on the enormous technical potential and on its position as the world's leading authority in this sphere. At the same time, it is recognised that power output is likely to be unpredictable and that significant improvements will be needed in transmission facilities between the resource and the major markets for electricity. Respondents have welcomed the launch of a new wave programme but are calling for finance to be made available for R&D, for the development of new designs of wave machine, and for market stimulation.

WIND POWER

83 Wind power has elicited more comment than any other individual technology, with respondents divided between support for and opposition to its development. Supporters perceive wind to be a cost-effective way of meeting Government targets in terms of renewable energy and emissions reduction. There is concern at the lack of a viable UK wind turbine manufacturing sector, and opportunities for the development of both small and large turbines are highlighted, along with a call for funding.

84 Environmental/countryside groups and members of the public are those expressing the greatest reservation about this technology. Wind turbines are perceived as industrial developments that damage the landscape and pose a major threat to the environment. Their adverse effect on tourism - present and future - is highlighted, and other problems raised include declining property values and the impact of turbine noise and rotation. There are particular concerns in Wales, Scotland, Cornwall and the Lake District, although one Scottish respondent suggested that Scotland could 'house' a small number of appropriately sited super windfarms in areas close to main grid connections.

85 There is also a widespread perception that, in practice, wind power contributes little to UK electricity supplies and/or CO_2 savings. Power generation is intermittent, and the technology is regarded as inefficient and unreliable. Further concerns relate to the DTI's implication that planning objections to wind power are wrong. It is proposed that there should be clearer guidance as to the areas most suited to the development of wind power, and that these areas should include locations with a lower average wind speed.

86 There is mounting pressure from the wind industry and others for progress offshore. There is considered to be enormous potential for this technology, and it is recognised that an offshore wind industry can benefit substantially from procedures and techniques already developed for other offshore activities.

However, support for more rapid progress in this field is tempered by concerns that offshore wind is not free of environmental consequences, especially in near-shore locations, and there are calls for the protection of certain coastlines, seascapes and designated areas, for instance by ensuring that development is sufficiently far offshore. Respondents have also highlighted the need for transmission network reinforcement and for an effective planning control mechanism.

OTHER TECHNOLOGIES

87 A small number of respondents (10) have commented favourably on the contribution that a ***tidal barrage*** such as the Severn Barrage would make in meeting the Government's renewable energy targets. There is a perception that the project has been unfairly disadvantaged because of its high capital costs, and that more attention needs to be given to whole-life costs in line with current Government thinking. Those specifically opposing the barrage approach (4) have done so on environmental grounds.

88 There is a view (5 respondents) that ***geothermal energy*** can make a significant contribution to reducing fossil fuel use and greenhouse gas emissions, although development would necessitate further R&D, market stimulation and substantial public funding.

89 Several respondents believe that it is inappropriate to classify ***hydrogen technology*** as very long term on the grounds that it is already being taken seriously by energy analysts all over the world, both as an energy carrier and as a potential storage medium.

FINDINGS

90 The main findings of this consultation on renewable energy for the 21st century can be summarised as follows.

- The Government is seen to be taking renewable energy seriously, including recognition that renewable energy has an important role to play in meeting climate change targets, but consideration should be given to its use for heat and transport applications as well as for electricity generation.

- Renewable energy should be developed as part of a balanced energy policy that gives appropriate consideration to energy efficiency, demand reduction and nuclear energy.

- There is general support for the Government's target of working towards providing 10% of UK electricity supplies from renewable sources as soon as possible, and hoping to achieve this by 2010. There was also some questioning of the Government's commitment to this target, and of the target's achievability given current planning and financial constraints and the limited level of development achieved to date.

- There is also support for the setting of regional targets to help ensure the effective take-up of renewables.

- There should be increased levels of support for the renewables industries, both to develop a thriving home market for these technologies and to encourage exports.

- Any future NFFO/Fossil Fuel Levy arrangement should be an improvement on the existing mechanism. There should be greater consideration of environmental and planning issues at an early stage, and support should be given to a wider range of technologies and to projects of varying scale.

- Any obligation to supply electricity from renewable sources should rest with suppliers.

- Both the benefits and the problems of embedded generation are highlighted, and there are calls for further studies of the issue as well as for improvements.

- There is recognition and considerable concern that RETA will disadvantage small-scale, intermittent generators of electricity from renewable sources.

- There is widespread support for an appropriate programme of renewable energy R&D, with higher levels of investment and a focus on longer-term technologies and on environmental as well as technical issues.

- Grant aid is an appropriate method of support in certain instances.

- Renewable energy should be exempt from the proposed Climate Change Levy. VAT and other areas of taxation should not disadvantage development in this sphere.

- Calls for clearer planning guidelines and for education of the public and the planners are tempered by concerns that the planning system should not be weighted in favour of renewable energy development.

- UK policy development should remain in line with European policy development.

ANNEX

LIST OF RESPONDENTS

Conventional Energy Sector

R J B Mining (UK) Ltd

London Electricity plc

PB Power Ltd

PowerGen

Yorkshire Electricity

Association of Electricity Producers

Coalgas Plc

Midlands Electricity

Electricity Association

Rutherford Appleton Laboratory

British Nuclear Fuels Ltd

Scottish and Southern Energy

Eastern Group

Northern Ireland Electricity plc

National Grid

A Power for Good Ltd

Milton Keynes Energy Agency

Eastern Electricity

British Gas

Combined Heat and Power Association

National Power

Marches Energy Agency

Forest of Dean Energy Team

BG plc

Coalgas (UK) Ltd

SEEBOARD

Energy Saving Trust

Neighbourhood Energy Action

SWALEC

Scottish Power

Energi from NORWEB

Swansea Energy Agency

British Energy

Renewable Energy Sector

Water Power Engineering

Belfast Electric Vehicles Initiative (T L De Winne)

WRE Limited

Powertech Solar Systems Ltd

Fibrowatt

KTI Energy Limited

Econnect

Non-Fossil Purchasing Agency

Fivestone Limited

Wind Energy Planning

Scottish Solar Energy Group

British PV Association

IT Power Ltd

Hyder

Solar Century Ltd

British Hydropower Association

Medway Energy Ltd

Allied Designs

Landfill Gas Association

British Biogen

The Amset Centre Ltd

Shell

National Wind Power

Alba Energy Ltd

Energy from Waste Association

Midlands Renewable Energy Technology Transfer (MRETT)

British Wind Energy Association

Peter Brotherhood Ltd

Severn Tidal Power Group

Renew North

Scottish Renewables Forum

Filsol Ltd

AES Limited

A L Burton, MICE, Wind Energy Consultant

ENER.G plc

Energy 21

HEBE

J & Y Miller

Border Wind Ltd

A J Nicholls

Taylor Woodrow

Natural Power Ltd

J A Consultants

Gloucester Harbour Trust

B9 Energy

Tarmac

British Association for Biofuels and Oils (BABFO)

Blairhill Water Power Co Ltd

Allied Design Ltd

Gordon Senior Associates (GSA)

Renewable Energy Systems Ltd (RES)

Cory Environmental

Severn Estuary Strategy

Roger Booth, Consultant

British Photovoltaic Association

B P Solar

Active Solar Thermal Industry Group (ASTIG)

EnviroEnergy Ltd

The Solar Energy Society

Solar Network

Cwmni Gwynt Teg Cyf

Energy & Environmental Association

Solar Trade Association

Impax Capital Corporation Ltd

Clearwave (UK) Ltd

Utilicom Ltd

Tidal Electric Inc.

Geoff Loram

Slough Heat & Power

Energy Power Resources Ltd

Dyfi Eco Valley Partnership

Countryside/Environmental Groups

Camel Area Friends of The Earth

Council for the Protection of Rural England

West Cumbria and North Lakes Friends of the Earth

Countryside Council for Wales

Friends of the Lake District

Green Party Energy Group

Group 25, Allerdale, Lake District

The Ramblers' Association

Association for the Protection of Rural Scotland

Northern Ireland Environmental Link

Keep Galloway Beautiful

Natural Environment Research Council

English Nature

RSPB

North Cornwall Marketing Group

Country Landowners Association

The Countryside Agency

Saffron Walden and District Friends of the Earth

Group Against Windfarm Proliferation

Conservation of Upland Montgomeryshire

Friends of the Earth, Scotland

Peak District National Park

World Wildlife Fund

SERA Labour Environment Campaign

Greenpeace

Scottish Environmental Protection Agency (SEPA)

Country Guardian

Scottish Natural Heritage

The Environment Agency

Forum for the Future

The National Trust

Conservation of Upland Radnorshire & Breconshire

Countryside Protection of Rural Wales

Green Alliance

Council for National Parks

Mike Smith, Environmental Consultant, Cordah Ltd

Education Sector

Open University, Energy and Environment Research Unit

Scottish Agricultural College

University of Reading

Imperial College

The National Energy Foundation

De Montfort University

University of Newcastle Upon Tyne

SPRU, University of Sussex

Clean Energy Educational Trust

MPs

The Rt Hon Michael Jack MP

Tim Boswell MP

Rt Hon Peter Brooke CH MP

Minister of State for Foreign and
Commonwealth Affairs

The First Minister (Designate)
For the New Northern Ireland Assembly

Cynog Dafis AS/MP

Rt Hon. Sir Edward Heath, KG., MBE., MP

John Hume MP

Dr Lewis Mooney MP

David Drew MP

Andrew Stunnell OBE., MP

Local Government

Powys County Council

Aberdeenshire Council

Pembrokeshire County Council

East Midlands Regional/Local Government Association

Shropshire County Council

North Somerset Council

Woking Borough Council

County Borough of Blaenau Gwent

Nottinghamshire and Derbyshire Local Authorities Energy Partnership

Local Government Association

Wycombe District Council

Norfolk County Council

Gloucestershire County Council

General Public

Ralph Rigg

W Bailey

Christopher Kelsey

Miles Seaman, Independent Adviser

Geoffrey T White

W B Fox

Michael Hird

Robert Speht

Professor Ian Fells

Margaret Watton

Anthony Heald

Dr A Dutton

Ada Soares

Robert and Rosemary Woodward

Ian Trevor/William Daycock

Tony Robson

Magnus Rodrigues

N W Neville

David Ross

GJL Coltart (Consulting Civil Engineer)

Tony Michael

John Bussy

Dr C H Osman

C D Humphrey

Peter Ravine - Australia

Elizabeth Mann

Anthony Powell

David Milborrow

G McCormack

Ivor John Pearce

Louise Muston

L R Mytton

Hazel Macmillan

Pat Mortimer

Michael Hatfield

Geoffrey Ratcliffe

Steve Parry

Bruce McRobie

James Page

Other

Financial & Business Publications

The Law Society

Crestport Services Ltd

ADAS Consulting Ltd

Forestry Commission

Institute of Directors

Campbell Carr Ltd

CBI

Crown Estate

National Farmers' Union

Institution of Professionals, Managers and Specialists (IPMS).

Royal Society of Edinburgh

Society for Underwater Technology

Institution of Electrical Engineers

David J Bone, Wright, Johnston and Mackenzie

Chartered Institution of Water and Environmental Management (CIWEM)

Architects and Engineers for Social Responsibility

Centre for Exploitation of Science and Technology

UNISON

Institution of Mechanical Engineers

Institution of Chemical Engineers

Fred. Olsen

Hoare, Lea & Partners

Institute of Physics

The Institution of Civil Engineers

ILEX

Yorkshire Water plc

SEICOMB

Thames Water

British Nuclear Industry Forum

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