Economic Development Committee

Review of Energy Policy in Wales

Renewable Energy - Final Report

January 2003

CHAIR'S FOREWORD

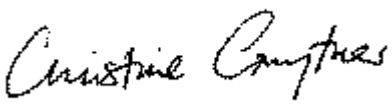
This is the third report in the Economic Development Committee's Review of Energy policy and gives the Committee's conclusions following the consultation on its proposals in respect of renewable energy.

We were keen that our consultation report should stimulate a full and wide-ranging debate on these important and difficult issues and we were very pleased that so many people and organisations took the time and trouble to let us have their views. We have read and thought very carefully about all of them. Not surprisingly, not all the respondents agreed with each other. But what did come across strongly and consistently was the clear message that the people in Wales care strongly about their environment and are committed to ensuring a sustainable approach to meeting our energy needs in the future. We also received a clear message that Wales welcomed the Committee's decision to look into these issues and it is in the light of this positive response that we now put forward our final recommendations.

The Committee is very grateful to the wide range of people, listed in Annex D, who made submissions in the consultation.

We also very much appreciated the advice and guidance from our 'Reference Group', listed in the previous report, which acted as a sounding board and source of valuable advice in developing the programme for the Review and our conclusions. The content of the report is nonetheless the sole responsibility of the Committee.

I would also like to place on record our continuing gratitude to Professor Jake Chapman who has been our Expert Adviser in this Review. He has provided high-quality, user-friendly advice on a very complex subject and has ensured that our conclusions fully recognise the developments at the UK level proposed by the Performance and Innovation Unit of the Cabinet Office with whose Review he was also deeply involved. Finally, I would like to record my, and the Committee's, appreciation of the work of our Committee Clerk and Deputy Clerk, John Grimes and Siân Wilkins, and the valuable support we have all received from Gareth John in the secretariat.



Chris Gwyther
Chair
Economic Development Committee

Membership of the Economic Development Committee

Christine Gwyther (Chair)
Carmarthen West and South Pembrokeshire

Mick Bates
Montgomeryshire

Alun Cairns
South Wales West

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Andrew Davies
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Swansea West

Ron Davies
Caerphilly

David Ian Jones
North Wales

Elin Jones
Ceredigion

Dafydd Wigley
Caernarfon

Phil Williams
South Wales East

This is the current membership of the Economic Development Committee. During the course of the Review, David Davies, Mike German and Brian Hancock were also members of the Committee:

1. INTRODUCTION

1.1 In April 2002 the Economic Development Committee published its consultation report on renewable energy in Wales.[1] It set out a vision for renewable energy:

> *".....a vision .....that emphasises safe, clean and secure energy supplies and contributes positively to reducing global warming. It should emphasise that this will provide opportunities for industrial and rural development, long-term employment and increased prosperity. Most of all it [the Welsh Assembly Government] should promote this vision by example and by vigorously pursuing well thought out policies."*

Extract from Consultation Report

1. There is a strong scientific consensus that the use of fossil fuels has led to an unprecedented increase in carbon dioxide concentrations in the atmosphere and that this is causing significant climate change. A wide range of studies has pointed to the need to reduce carbon emissions by more than half by about the middle of the century in order to mitigate the extent of climate change. Even so increases of temperature of between 2˚C and 5˚C are expected, with a rise in sea level of about 0.5m as well as increased precipitation and frequency of storms.

2. Energy policy has to serve all aspects of sustainable development, economic, social and environmental. However, it is clear that for the immediate future environmental concerns must take priority. The necessary reductions in emissions can be achieved by significant increases in energy efficiency, including transport vehicle efficiency, and by reducing the carbon intensity of the fuels used, particularly electricity. Moreover, they can be achieved at relatively low cost.

3. The need to address these changes presents major opportunities for Wales to apply its traditional expertise in the fields of manufacturing and engineering, and to utilise its natural resources, for economic benefit and job creation in both industrial and rural parts of the country. This report focuses on the development of renewable energy as a way to reduce carbon emissions. Later reports will cover energy efficiency and other aspects of policy.

1 Economic Development Committee Report for Consultation - Review of Energy Policy in Wales Part I: Reviewable Energy - http://www.wales.gov.uk

4. Over the next 20 years almost half the power stations in England and Wales will need to be replaced. Wales currently has more than its share of generating capacity, though a smaller proportion of renewable production. Wales has a potentially large renewable energy resource base and there are commercial and rural development opportunities associated with the development of several renewable technologies. Renewable sources have different costs, availability and resource potential. It appears that a mix of on-shore and offshore wind, biomass, tidal and wave sources will yield the most appropriate medium term contribution to power production. In order to achieve this it is essential that the current barriers to development are addressed, in particular:

- a streamlining of the planning process;
- facilitating embedded generation;
- removing the current penalty applied to intermittent sources of electricity in the wholesale market;
- providing support for the development of local niches and industries.

1.2 The report made six broad recommendations relating to:

- reducing carbon emissions;
- targets for the production of renewable energy;
- The National Assembly for Wales setting an example in the use of green energy;
- embedded generation;
- planning procedures in respect of renewable energy projects;
- the energy sector as an economic sector with high growth potential.

1.3 The Committee hoped that its report would stimulate a wide public debate on the subject of renewable energy and invited views from people and organisations within Wales - and more widely. Members were pleased by the response and are extremely grateful to the very many people who took the time and trouble to respond. A wide range of views was put to the Committee and these included a wide range of opinion.

1.4 In keeping with the National Assembly for Wales' policy of open government, all the responses have been published on the internet.[2]

2 http://www.wales.gov.uk

2. SUMMARY OF RESPONSES RECEIVED

Number of responses

2.1 A total of 146 individuals and organisations responded to the consultation. In addition the Report was discussed at the North Wales, South West Wales and South East Wales Regional Committees. The Mid Wales Regional Committee discussed renewable energy on an earlier occasion and the views expressed at that meeting have also been considered as part of the consultation.

2.2 At the same time as the Committee's consultation exercise, Friends of the Earth, Cymru launched a campaign to encourage people to support the development of renewable energy in Wales and issued leaflets together with a pre-printed postcard, which they invited members of the public to send to their Assembly Member. In the course of the consultation, 318 of these were forwarded by AMs to the Committee Secretariat. In some cases, the respondent had added their own comments to the printed card and in these cases these have been treated as an individual response to the consultation. Of the 146 responses referred to above, 25 were in the form of additional comments on these cards.

Source of responses

2.3 Responses came from a wide range of sources: from individuals, from Councillors writing personally or on behalf of their constituents or authority, from business, and from public sector and voluntary organisations. 15 responses came from outside Wales – in one or two cases these were from people located near the English border, most of the remainder were from UK bodies with offices in England that covered the whole of the UK.

Type or Response

2.4 The Chair's letter invited views widely on the subject of renewable energy and suggested respondents might find it helpful to address their comments in relation to the 6 recommendations made in the report. In some cases, respondents did this, in others they commented on wider issues in relation to the energy sector and sometimes on specific issues of particular concern to them. The length of response varied from a few words or lines, to more substantive documents.

2.5 Most responses were submissions from individual people or organisations. In a number the response has been a letter saying simply that they agreed with the comments made by another – in one example, 19 respondents signed a standard letter (presumably presented by the original author). The Friends of the Earth postcards are a similar example of a particular view being actively canvassed and supported by a promoter of a viewpoint. There was also a case, and may be others, in which a senior officer in an organisation contributing to the consultation has written separately in a personal capacity. There is nothing wrong with any of these – there were no 'rules' about who might respond – but they are relevant to the interpretation of the results.

2.6 It should be added that persons or organisations responding to the consultation were self-selected and did not constitute a 'random' or 'representative' sample in any statistical way. Consequently it cannot be assumed simply that the proportion of respondents expressing views for or against different issues in the consultation reflect the proportions in the population of Wales generally.

3. GENERAL THEMES TO EMERGE

General reaction

3.1 The overwhelming response from the consultation was one of welcoming the Committee's decision to examine the issues relating to energy in Wales, and in particular, renewable energy. Everyone agreed that it was an important subject and one for which Wales needed a clear and considered policy. There was a clear recognition of the need for a widely-based debate on the subject and for the Economic Development Committee's role in encouraging and facilitating this.

Reductions in overall energy consumption

3.2 One of the strongest themes to emerge in the consultation was the view that Renewable Energy should not be considered before, or separately from, the wider issue of reducing energy consumption overall - including energy used by transport. This view was not restricted to people opposed to the development of new forms of energy but was a common theme reflected by a large number of people. The reason for approaching the Review in stages, and concerns about the loss of investment, was explained in the Committee's report but the underlying concerns about Wales losing valuable investment was not something that many respondents recognised as an issue.

3.3 Alongside this, a number of people said that priority should be given to the installation of solar panels and higher levels of insulation on new and, where possible, existing houses. A number of people also linked this to the development of community heating and community energy schemes and some to the need for more recycling of waste. In some cases this led onto the generation of electricity from waste although others commented that the latter is not truly a renewable resource. Reference was also made to 'cheap energy' policies and some thought it inappropriate to separate heat and electricity. Others broadened the subject area to expressing views about incinerators generally.

Global warming

3.4 Generally speaking, respondents accepted the conclusion that global warming was a major challenge which needed to be addressed and that the present pattern of generating

and consuming energy could not continue. However, there were a small number of people who questioned the assessment that global warming was the consequence of excessive discharges of carbon dioxide into the atmosphere. These included some detailed responses showing some careful examination of this issue. Reference was also made to academic publications by Philip Stott and by Bjorn Lomberg which cast doubt on many of the claims made about the causes of global warming.

3.5 The vast majority of the remainder agreed with the Committee's view that it was necessary to increase the amount of energy generated from renewable sources and there was a clearly expressed view that this needed to be done sensitively and so as not to prejudice tourism or areas of environmental significance. However, in one or two cases respondents indicated that they considered the situation so serious that there was no alternative but to act and that the cost of this would have to be faced up to.

Renewable energy

Sources

3.6 A large number of respondents spoke of renewable sources of energy only in terms of wind turbines on Welsh hillsides. In some cases, strong support was given to the need to develop other forms of renewable energy and, in a few, quite careful analyses were presented of the opportunities that were offered by Biomass, lipids, waste cooking oils and animal fats. One or two mentioned the importance of developing the hydrogen economy. Very few respondents commented on tidal energy.

Wind energy

3.7 The widest range of views, not surprisingly, was on the subject of wind energy. Those in favour considered it offered opportunities for highly-skilled jobs, investment and for Wales to establish itself in a key technological area. Nonetheless, virtually everyone in favour recognised the issues that wind turbines posed for tourism and the visual environment, and there was a widespread view that these issues had to be considered carefully in respect of any development. The issue was not one sided though, with one respondent referring to an example (in England) where a wind farm and its visitor centre had provided a significant tourism opportunity and attracted large numbers of visitors.

3.8 Many of those opposed to wind turbines spoke of their impact on the visual environment and the major importance of tourism to Wales. This is in fact an area where there is relatively little hard data and a couple of respondents suggested that a careful cost benefit analysis should be undertaken of this. Others expressed the view that the economic case for wind energy was unsound because there were very few jobs to be created by wind energy – and given that other countries, particularly Denmark, were further advanced than the UK, any expansion in Wales would simply draw in surplus technology from elsewhere. Indeed, given recent announcements about reductions in the use of wind energy in Denmark we would lay ourselves open to the dumping of equipment.

3.9 Relatively few of the respondents opposed to wind turbines offered an alternative other than reducing electricity consumption generally. Some commented that Wales, and some also the UK, was too small to have any impact on what was a 'global' issue. A few added that there was little point in doing anything until the USA became more energy conscious. Others emphasised the importance of pursuing other renewable technologies, that wind turbines were only a part of the solution and that at best wind turbines should be seen as a short term measure while other technologies could be developed. Balancing the arguments, the view was also expressed that we must accept that all forms of energy have a cost.

3.10 Relatively few respondents commented on off-shore wind turbines. However in one careful analysis, the view was expressed that subject to appropriate siting and scale, offshore wind farms have the potential to bring direct bio-diversity benefits. In particular, with no trawling between turbines the area could become a marine safe haven for spawning fish and other marine life.

Wider impact of wind turbines

3.11 Alongside some careful analysis from a range of people, there were also a number of views expressed which had limited scientific support. Annex A of this report addresses some of these.

3.12 Some respondents spoke of "a wind turbine on every hill in Wales", others of "hundreds of wind farms in Wales". The Committee's report however estimated that the maximum under the 'green future' option would be 200 on-shore turbines and 150 off-

shore – and this can be checked with some elementary arithmetic – although it does also depend on the size of the turbine installed.

3.13 Further comments were made about the amount of energy involved in the production and installation of wind turbines – and reference was made to reports that these consumed more energy than the turbines would ever create. It was argued (erroneously) that in this sense wind energy could not be considered 'green'. These analyses are in fact not scientifically valid.

3.14 Concerns were also expressed about the risk of mechanical failure with wind turbines and the possible hazard they can present to bird populations. However, the response from the Royal Society for the Protection of Birds Cymru indicated that, subject to appropriate scale and siting considerations (with reference to habitats, flight patterns and migration routes) wind turbines present no significant risk to bird populations. Indeed, they expressed strong support in principle for the development of renewable technologies as contributors to climate change mitigation.

3.15 A number of people were also under the impression that the 'Government' funded wind farms and the comment was made that the only profits they make are the grants received. In fact, all investment in the production of renewable energy is made by the private sector and support from government is largely restricted to the development of new and developing technologies. There is virtually no public assistance available for on-shore wind farms.

Hydropower

3.16 On the question of hydropower, one respondent referred to the forthcoming implementation of the EU's Water Framework Directive which it was considered would have a major negative impact on the production of hydro-energy in Wales and that the National Assembly should follow Scotland's example in seeking a derogation from it.

Targets for renewable sources

3.17 A number of respondents said that figures presented on levels of energy generated and consumed in Wales, and particularly when the renewable part of this was expressed as a percentage, were unreliable and often misleading because the sources operated at these

levels for only a part of the time. For example, while a wind turbine might have an installed capacity of, say, 100MW its actual output over a period of time depended upon weather and other factors and would be significantly less than the maximum. To some extent this is primarily a matter of being clear about how figures are described and presented. Those contained in the Committee's report for total output in a year (Terrawatt hours) reflect the 'down time' of an intermittent source.

3.18 There were different views on the way that Wales should set a target for itself and whether it should be based on the amount of energy generated in Wales – or the amount consumed in Wales which is somewhat lower. The general view of respondents was that Welsh consumption rather than Welsh production was the more appropriate comparator – but most preferred the approach of expressing output in absolute terms i.e. in Terrawatt hours. This has the advantage of taking into account the intermittency of renewable sources of energy.

3.19 It was perhaps disappointing that while many respondents were in favour of setting a target, relatively few addressed the question of the target itself. Those generally in favour of renewables tended to go for one at the higher end of the scale 'Green Future' or 4TWh or more. The Friends of the Earth card gave a figure of 6TWh and a couple of responses said that Wales should be looking to attract as much investment in this sector as possible. However, those who had reservations about wind turbines, even when these did not amount to an outright objection, tended not to address the question of a target.

3.20 One or two people commented that it was pointless to set targets without specifying how they would be achieved.

3.21 Overall, respondents fell into 2 broad groups. In one, the setting of a target for renewable energy was seen as Wales' acceptance of a share of the responsibility that has to be shared by the UK. This was further split into those who recognised the need for some level of wind energy but felt that their part of Wales had already contributed more than its share. The other group saw the drive for renewable energy as an opportunity for Wales to secure investment and jobs and from which it should be seeking maximum benefit. In part the difference in attitude might have reflected a difference in perception about the level of jobs and the scale of the benefits available from renewable energy.

3.22 In many ways, the question of how one expresses the figures is critical only to people in the first of these 2 groups. If the issue is about one's share of a 10% or 20% target then there is something to be gained from arguing over the figures. On the other hand, if the issue is about Wales' own aspirations, and the opportunities and obligations of renewable energy, then what really counts is the number and type of renewable sources pursued and their wider impact – both positive and negative.

Nuclear energy

3.23 A small number of people mentioned nuclear energy and while respondents were generally opposed to it on grounds of both cost and safety, this view was not unanimous. The views were expressed that the dangers are exaggerated in the press, and that it should not be ruled out as a last resort.

Composition of Economic Development Committee

3.24 A number of people commented on the lack of rural Assembly Members on the Committee and indicated that some members' political position on renewable energy meant that their minds were made up before the consultation. In part this reflected a lack of understanding of the role of the Committee in undertaking a Review and a perception that EDC had been established solely to review energy policy and that the Committee on its own would set the policy and targets for Wales.

4. RESPONSES ON INDIVIDUAL RECOMMENDATIONS

Recommendation 1

We recommend that the National Assembly for Wales:

(a) recognises that over the next twenty to fifty years it will be necessary to move towards a zero carbon electricity system;

(b) seeks to develop its indigenous renewable resources so as to make a timely contribution to the reduction of carbon emissions;

(c) promotes renewable sources of energy in such a way as to enhance industrial, rural and commercial opportunities in Wales without prejudicing tourism or areas of environmental significance.

4.1 While one or two respondents questioned the claims that global warming was due to carbon emissions, there was general support for this recommendation but with particular emphasis on the final words `without prejudicing tourism or areas of environmental significance'. There were comments that there was no easy way to balance economic considerations with those of climate change friendly energy supplies and that there will be some hard choices ahead. At the same time it was noted that it was not necessary to move to a zero carbon emission system – but in the first place it was necessary to move in that direction.

The Committee's response:

4.2 A number of respondents made the point that the development of renewable sources of energy had to go alongside improvement in our use of energy and the development of far greater energy efficiency. The Committee fully recognises this and did so when preparing its report. However, its perception was that there was a greater urgency associated with the issues related to renewable energy and for this reason chose this as the subject of its first report.

4.3 There was a wide measure of, indeed almost unanimous, support for this recommendation. A number of respondents emphasised the importance of the final few words "without prejudicing tourism or areas of environmental significance" and the Committee fully accepts this – indeed they were included in the original recommendation because they are so important. But while a number of people asserted that turbines on hills could adversely affect tourism, the Committee has found no evidence of this. Indeed, 1 or 2 respondents referred to tourist opportunities flowing from visitor centres at renewable energy sites and the results of the survey by MORI in Scotland, released since the end of the consultation, confirms both these views.

4.4 Nonetheless, the Committee is conscious that the fact that there is no evidence of an adverse effect does not mean that no such effect exists. Given the very great importance of tourism to the Welsh economy, the Committee recommends that the Welsh Assembly Government monitors the information that is available from its own and other sources and reports to the Committee on its findings from time to time. Subject to this, the Committee endorses Recommendation 1 in its report.

Recommendation 2

We recommend that the National Assembly adopts Welsh targets for both electricity production and heat production from renewable sources by 2010 and 2020, bearing in mind the overall target for the UK of 10% of electricity generated from renewable sources by 2010. These targets should be set in the light of the responses to the consultation on this report.

In order to promote these targets the National Assembly should seek information from all Local Authorities on the contributions that they consider could be made to meeting such targets from within their areas.

4.5 A number of people commented on the way in which targets are expressed and the general view was that the best way to do this was in terms of net output in Terrawatt hours. This avoids debates about whether one relates output to welsh consumption or production – and also the fact that for many renewable sources actual output is much lower than the theoretical capacity.

4.6 Not many respondents commented on the levels of output that might be achieved from the different renewable sources. Many, in fact, made no comment at all on the question of targets – particularly respondents who were opposed to wind, or other forms of renewable energy. One or two said there was little point in setting a target unless one also sets out precisely how it would be achieved. Rather more considered it was worthwhile to set targets but did not give any indication of the level they would support.

4.7 Apart from the Friends of the Earth cards which quoted a (high) figure of 6TWh, about 20 respondents commented on the level of a target. A couple argued on grounds of feasibility for a 'modest' level - perhaps around 1.5-2.0 TWh, while the remainder expressed the more aspirational view that Wales should seek to do as much as it could. These tended to go for a target at or above 4TWh – and up to 6TWh (although one did argue for 100% renewables in 20 years.)

The Committee's response:

4.8 The Committee spent a considerable amount of time discussing the setting of a target for its original report and was slightly disappointed that very few people addressed the question of a level in any detail. In many ways one might conclude that there is not a strong demand for a target as such – but the Committee considers it important that Wales gives a clear indication of that it wishes to attract investment in the renewable energy sector.

4.9 The Committee also recognises that developments in the renewable energy sector happen rapidly and that views on what might now be realistic or demanding could quickly change. It therefore feels that rather than set a target, which implies an ultimate goal, it should be looking to establish a 'benchmark' against which progress can be measured – and which can be reviewed as circumstances change and against which progress to zero carbon electricity by 2050 can be measured.

4.10 There was a strong demand from a number of respondents for an 'aspirational' level. However, notwithstanding the difficulties in selecting a particular figure, the Committee accepts the argument put to it that a target should not simply be plucked from the air but based on what seems realistic and achievable. It also acknowledges the concerns about the intermittency of renewable energy and agrees that any benchmark should be set in terms of net output over the course of a year and in Terrawatt hours.

4.11 The Committee considers that Wales should set itself a benchmark of 4 TWh per year. This is a realistic figure for 2010 on the basis of existing plans and amounts to just over 10% of Welsh electricity production. The Committee estimates that this would be made up of roughly equal parts on shore wind, off shore wind and other renewable sources. In the longer term, it expects on shore wind to play a decreasingly smaller part in this.

4.12 Subject to this, the Committee endorses its Recommendation 2 and recommends that the Welsh Assembly Government should seek information from local authorities on the contributions they considered they could make to this. It also recommends that the Welsh Assembly Government establishes a mechanism to monitor performance against this benchmark and to report to the Committee from time to time on progress.

Recommendation 3

We recommend that the National Assembly continues to develop its own use of renewable energy with the aim of becoming a 100% user of renewable energy and urges other agencies and public bodies in Wales to foster the development of renewable energy by:

(a) switching to green electricity for their own use;

(b) supporting development projects for technologies that exploit local opportunities or unique resources.

4.13 There were relatively few comments on this recommendation and generally people were in support of it although some expressed doubts about the concept of 'green' energy within a national grid system.

The Committee's response:

4.14 Very few respondents commented on this recommendation and some of those that did expressed doubts about the concept of 'green' energy within a system based on supply from a pool of electricity within a national grid. While it is quite correct that an end user cannot distinguish the source of the electrons that provide its power, mechanisms to promote 'green' electricity are important because they establish a process by which consumer pressure can increase the availability of energy from green sources. Since making the recommendation the National Assembly has continued to develop its own use of renewable energy. We welcome this and urge it to continue with this policy and to urge other agencies and public bodies in Wales to do likewise.

Recommendation 4

The National Assembly should add its weight to the pressure to resolve the issues of embedded generation and wholesale market treatment of intermittent sources as a matter of urgency. It should also request clarification from the local Distribution Network Companies on their policies for connections for renewable generators.

4.15 There were relatively few comments on this recommendation but these were generally in support of it.

The Committee's response:

4.16 The Committee endorses this recommendation.

Recommendation 5

The National Assembly should:

(a) as a matter of urgency, seek ways to clarify and streamline the planning process for renewable energy developments;

(b) seek an extension of its powers with regard to the approval of power generation facilities;

(c) find mechanisms whereby renewables developments can provide immediate and tangible benefits to the local communities in which they are located.

4.17 This recommendation came in three parts. On (a) there was a degree of sympathy for eliminating delays and blockages in the planning process but the vast majority of respondents (perhaps not surprisingly) did not seem to see these as problems. Business respondents did though. In one case it was suggested that the National Assembly was often the cause of the delays. However, there was a very clear message that respondents saw the planning process as the correct and democratic way to weigh up the difficult competing arguments in respect of renewable energy developments. Clearly it was important that the process was efficient and did not involve undue delay, but there was a very clear view that these decisions must be made democratically and the systems should not be made any less rigorous.

4.18 There was general support for (b), that Wales should have the power to decide planning application of all sizes, although one or two people commented that Wales could not, or should not, consider its needs in isolation from the UK. The view was expressed that if the Assembly or local authorities were to take on greater responsibilities there would be resource consequences.

4.19 There were relatively few comments on (c) and while some agreed with the principle, others thought this could be seen as offering bribes to the local community.

The Committee's response:

4.20 The consultation delivered a strong message that Wales should have powers to make its own decisions and that these should be done democratically. The Committee fully agrees with both of these. It was not our intention in the original recommendation to suggest that planning requirements should be relaxed in respect of renewable energy projects or that there should be any reduction in democratic control. However, there was clear evidence of long delays in making decisions on some projects and that some were being lost as a consequence of these delays alone, not because a decision had been taken that a particular project was unsuitable or undesirable. The Committee has no desire to weaken in any way the proper democratic control of planning issues. But it is to nobody's advantage if Wales is losing investment because decisions are taking too long if it is possible to avoid this.

4.21 Subject to this clarification the Committee endorses its recommendation.

Recommendation 6

We recommend that the Minister for Economic Development identifies the energy sector as a sector with high growth potential in Wales and ensures there are programmes in place to encourage the development of skills in all parts of the country to meet these needs, and to encourage private sector investment in this vital sector.

4.22 There was general support for this recommendation which it was noted was not restricted to 'renewable' energy. However, a number of people had doubts as to whether there were significant jobs to be created in the sector and expressed the view that an expansion would lead to an increase in imported wind turbines. Some took the view that due to the changes in Denmark we risk having surplus technology 'dumped' on Wales.

The Committee's response:

4.23 The Committee does not accept the arguments that there are relatively few jobs to be created in this sector and that this is not an important consideration. It does recognise that modern industry is not as labour intensive as industry was in the past but this is the case across the board. The energy sector is one in which there is scope for significant development and the Committee feels it is one that Wales should look to develop as a priority. It offers opportunities not simply in jobs for the generation of electricity but also valuable and skilled jobs in research into new technologies and their development. Wales is well endowed with renewable energy resources and has a good track record of manufacturing and engineering. The Committee recognises that a focus on this sector will not create large numbers of jobs overnight, but considers it to be one in which Wales, in the medium to long term, has the potential to become a strong player and from that to export both expertise and technology to the world.

5. CONCLUSION AND SUMMARY OF RECOMMENDATIONS

5.1 The Committee must express its thanks to everyone who has contributed to the consultation. We considered it important that there should be a full and wide ranging debate on these important and difficult issues and we very much appreciate the thoughtful and detailed contributions that were put to us. These covered a wide range of views, all of which were considered very carefully.

5.2 The consultation focused on the 6 recommendations made in our original report and the views expressed and the Committee's response to them is given above. Our final conclusions and recommendations are:

Conclusions and recommendations

5.3 There is a very strong scientific consensus that global warming is occurring and is largely due to the release of carbon dioxide resulting from the use of fossil fuels. The Committee accepts the broad consensus that in order to reduce carbon emissions to stabilise carbon dioxide concentrations it will be essential to pursue both energy efficiency and renewable energy sources with far greater vigour over the coming decades.

Recommendation 1

5.4 We recommend that the Welsh Assembly Government:

(a) recognises that over the next twenty to fifty years it will be necessary to move towards a zero carbon electricity system;

(b) seeks to develop its indigenous renewable resources so as to make a timely contribution to the reduction of carbon emissions;

(c) promotes renewable sources of energy in such a way as to enhance industrial, rural and commercial opportunities in Wales without prejudicing tourism or areas of environmental significance;

(d) monitors the information that is available from its own and other sources and reports to the Committee on its findings from time to time.

Recommendation 2

5.5 We recommend that the Welsh Assembly Government should set a benchmark for production of electricity from renewable sources of 4 TWh per year. This is a realistic figure for 2010 on the basis of existing plans and amounts to just over 10% of Welsh electricity production. The Committee expects that initially this would be made up of roughly equal parts on shore wind, off shore wind and other renewable sources. In the longer term, it expects on shore wind to play a decreasingly smaller part in this.

5.6 In order to promote these targets the Welsh Assembly Government should seek information from all local authorities on the contributions that they consider could be made to meeting such targets from within their areas.

Recommendation 3

5.7 We recommend that the National Assembly continues to develop its own use of renewable energy with the aim of becoming a 100% user of renewable energy. We recommend the Welsh Assembly Government urges other agencies and public bodies in Wales to foster the development of renewable energy by:

(a) switching to green electricity for their own use;

(b) supporting development projects for technologies that exploit local opportunities or unique resources.

Recommendation 4

5.8 The obstacles to embedded generation, connection charges and NETA have already been clearly identified (by the industry and in the PIU working papers) and recognised (by both DTI and Ofgem) as requiring urgent attention and there are various committees and working parties addressing these issues.

5.9 The Welsh Assembly Government should add its weight to the pressure to resolve these obstacles as a matter of urgency. It should also request clarification from the local Distribution Network Companies on their policies for connections for renewable generators.

Recommendation 5

5.10 The Welsh Assembly Government should;

(a) as a matter of urgency, seek ways to clarify and streamline the planning process for renewable energy developments while not diluting in any way the proper democratic control of such decisions;

(b) seek an extension of its powers with regard to the approval of power generation facilities;

(c) find mechanisms whereby renewables developments can provide immediate and tangible benefits to the local communities in which they are located.

Recommendation 6

5.11 The Committee notes the Welsh Assembly Government's commitment in 'A Winning Wales' to the development of clean energy technologies and for Wales to be a showcase of sustainable economic development. The issues addressed in the Committee's report clearly fall fully within the stated aims to increase research and development and innovation, and to build on Wales' considerable strengths in manufacturing.

5.12 We recommend that the Welsh Assembly Government identifies the energy sector as a sector with high growth potential in Wales. It should ensure there are programmes in place to encourage the development of skills in all parts of the country to meet these needs, and to encourage private sector investment in this vital sector.

Conclusion

5.13 There are many different perspectives, and both fears and opportunities, in the changes to the energy system that are already taking place and which will be accelerated over the next few decades. These changes will inevitably lead to both gains and losses for communities and institutions. Facilitating such change will be easier if it is fostered and supported by an inspiring vision of the future, a vision that encourages everyone to celebrate the opportunities and gains as well as bearing whatever costs are involved.

5.14 Alongside these direct energy issues there is a wealth of economic opportunities for Wales to embrace. New technologies provide major opportunities for research, development, investment, new skills and jobs. These will build on many of Wales' traditional strengths and provide opportunities for all parts of the country – including rural areas where the need for diversification is so urgent.

5.15 The National Assembly should seek to promote a vision for renewable energy in Wales that emphasises safe, clean and secure energy supplies and contributes positively to reducing global warming. It should emphasise that this will provide opportunities for industrial and rural development, long-term employment and increased prosperity. Most of all it should promote this vision by example and by vigorously pursuing well thought out policies.

Annex A:

RENEWABLE ENERGY: MYTHS AND LEGENDS

In the course of the consultation a number of claims were made that do not have much substance when viewed dispassionately against the facts. Some of these have gained popular credence and risk distorting this important debate. The Committee felt it worthwhile to respond to a few of the main ones by setting out the facts on them. It accepts that, as in any scientific debate, there is some degree of uncertainty to most issues and where this is the case this is shown.

Background information

A 1MW generator operating continuously (for 8,760 hours per year) will generate 8.76 GWh of electricity a year. Conventional power stations (coal, gas, nuclear) will operate for about 80% of the time – the remainder being used for regular maintenance and coping with occasional breakdowns. Wind turbines operate for a smaller proportion of the time because of the intermittency of the wind. An on-shore wind-turbine will have an average 'availability' of about 30%, an off-shore turbine about 40%. The off-shore turbine operates for more hours per year because the wind is steadier and more frequent off-shore.

Table 1. Outputs per MW installed capacity

	Availability	Output (GWh/year)	Households supplied
Conventional (e.g. gas)	80%	7.0	2,333
On-shore wind	30%	2.6	866
Off-shore wind	40%	3.5	1,166

The average household in the UK uses just less than 3,000 KWh per year[3] . This is used in the final column to indicate the number of households supplied by each 1MW generator. As wind technology has advanced the size of generators installed has increased, leading to reductions in costs. As of 2002, the best on-shore turbines are about 2MW in size and the turbines expected to be deployed in quantity off-shore would be about 4MW.

Common Misconceptions

1. Developers of wind farms make profits from public subsidies

There are no direct subsidies for wind farms or other forms of renewable energy. Until 2000 there was a scheme that encouraged the use of non-fossil fuels for the generation of electricity (referred to as NFFO). This was first introduced to support nuclear power. In the 1990s it was used to support the generation of electricity from wind-power through a series of auctions. Since 2001 suppliers of electricity have been obliged to buy a percentage of their supplies from renewable sources, or pay a surcharge equivalent to 3p/kWh for each kWh of shortfall. Some part of this surcharge can therefore be used to buy electricity from renewable sources and could be regarded as an indirect subsidy. It is regarded by the Government as necessary to ensure that renewable energy develops even when it is not directly cost-competitive with existing fossil fuel sources. (The alternative, of taxing fossil fuels to reflect their environmental costs, has been ruled out because of the impacts on fuel poverty and the competitiveness of UK industry.)

2. The problems in California were caused by expensive wind energy

In 2000 the state of California experienced serious shortages of electricity production with several power companies filing for bankruptcy because they had to pay more for wholesale electricity than they were permitted to charge their retail customers. This situation arose due to a shortage of production capacity (largely because of difficulties in obtaining planning permission for new capacity), shortages of gas supply capacity and a peculiar set of regulations. It had nothing to do with wind energy.

[3] Of the 100TWh used by all households about 30TWh is used in 'all-electric' households for space and water heating. Excluding this use of electricity the 25m households use 2800kWh each for lighting and all appliances.

3. The intermittency of wind energy causes serious problems for supply

In Great Britain the national grid system links all electricity production with all electricity consumers and it is managed so as to achieve a balance between supply and demand on a continuous basis. Electricity demand varies significantly from moment to moment. Certain events, such as a commercial break in a popular TV programme, or high powered locomotives disconnecting from the system, can cause very large increases or decreases in demand. These are accommodated by running a number of power stations at below full capacity (so called spinning reserve) so that a sudden increase in demand can be met by increased output and a decrease in demand met by reducing the output of other power stations. Whilst renewable energy contributes less than 10% of the total electricity supply its contributions are largely lost in the random fluctations in demand. The company operating the grid has estimated that it can accommodate intermittent sources of up to 20% of total supply with its current regime. To increase the proportion of intermittency above 20% is feasible but would incur additional costs and perhaps some new storage technologies.

4. Wind-power cannot replace other power stations

The argument here is that on days when there is no wind blowing the required electricity has to be generated by non-wind power stations, so even when we have a lot of wind turbines we will also still need all the existing power stations. This is broadly correct, though the days when there is no wind across the entire UK are extremely rare. In general, if wind generators are spread from the north of Scotland to the south of England the availability of the wind broadly evens itself out. This 'evening out' might be further enhanced by the new electricity links being built to Europe.

The main point is that the benefits of wind energy do not come from reducing the number of conventional power stations, but from reducing the burning of fossil fuel – it is this that generates the carbon dioxide which aggravates climate change. It is regarded as quite likely that if the contribution of renewable electricity increases then a number of the older power stations will be kept on as an emergency reserve for the few days a year when demand is at its peak and there is a significant drop in wind.

5. Wind power is expensive and will not become any cheaper

All technologies cost a lot more when new than when they are mature. There are many reasons for this - the most important being that the producers learn how to engineer the product better, increases in scale which reduce costs, and a steady stream of technological improvements. Between 1980 and 1995 the average cost of wind generated electricity in Europe decreased to about one tenth and it is expected to decrease by a similar amount over the next few decades. The Figure below shows the variation between production costs and cumulative production for the best and worst wind speed sites in Europe. Similar relationships between costs and production apply in most industries. The PIU Energy Review concluded that by about 2020 wind energy was likely to be the cheapest form of electricity generation available.

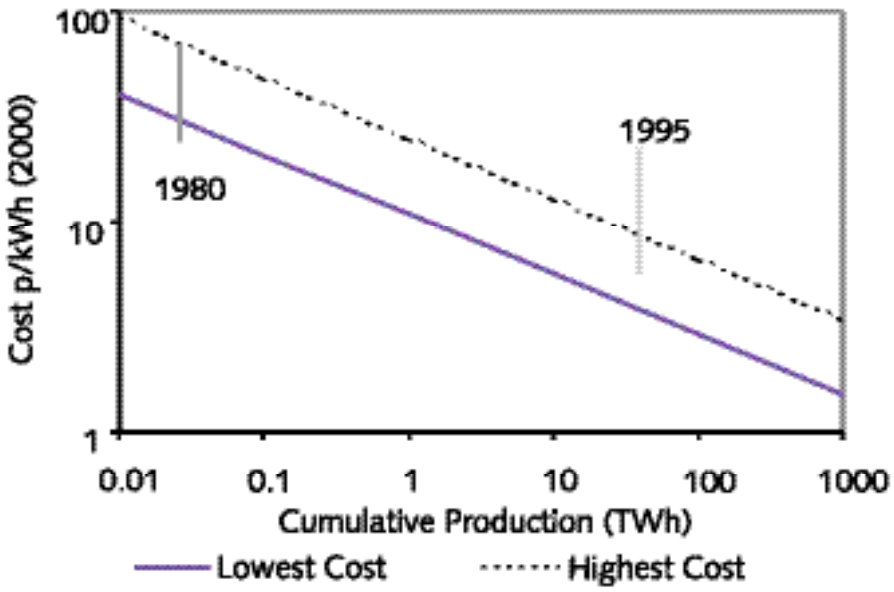


Figure 1. The decrease in costs of electricity from wind as a function of cumulative production (source: International Energy Agency)

6. Wind turbines do not repay the energy required to build them

All electricity generating equipment requires significant amounts of energy for its production and assembly. For example iron ore has to be converted to iron, then steel and then fabricated into pipes, machinery and bearings. The energy required to produce facilities power stations is sometimes referred to as their 'embodied energy' and this is included in

the 'life cycle' cost analyses. Not only does this include the energy to produce the components, but also the energy they use in operation, the energy for their maintenance, and the energy to dispose or recycle them. There is no universally agreed method of calculating these life cycle costs, so the results vary from one author to another. However there is one feature of all the analyses of alternative methods of power production that stands out, namely that wind power is fastest to repay the investment of embodied energy. It takes only a few months of operation (including the 30% intermittency factor) for a wind turbine to pay for itself in energy terms.

7. Wind-turbines will destroy tourism in Wales

There are several issues wrapped up in this assertion. First it assumes that there will be a very large number of wind turbines erected in Wales. Secondly it assumes that these will either be so numerous, or so sited, that they will be visible in all or most of the most favoured tourist areas. Finally it assumes that tourists dislike wind turbines sufficiently for the sight of them to overcome their attraction to the beauty of Wales.

The total number of on-shore wind turbines possible in Wales will be limited by many factors, not least the requirement to exclude them from National Parks and areas of outstanding beauty or scientific interest. In the first part of its Review of Energy Policy the Economic Development Committee published a number of scenarios of renewable energy deployment in Wales. The option with the greatest contribution from on-shore wind would require about 200 extra turbines.

There is no objective evidence available as to whether wind turbines increase or decrease tourist interest in an area. There have been several different surveys in other areas which generally report that the majority of people are not influenced one way or another by the presence of wind farms. The most recent surveys, carried out by MORI in Scotland and reported recently in the Times, concluded that "Nine out of ten tourists visiting some of Scotland's top beauty spots say the presence of wind farms makes no difference to the enjoyment of their holiday, and twice as many people would return to an area because of the presence of a wind farm than would stay away". Whether the same is true in Wales remains to be established.

8. Wind turbines are bad for bird populations

Whilst there have undoubtedly been a number of bird deaths associated with wind turbines the total number is not large. The Royal Society for the Protection of Birds Cymru has not raised this as an issue in its submission to the Committee. They point out that a wind farm location needs to be sensitive to migration paths and at-risk habitats. However their overall message is that global warming presents the greatest risk to bird species and that all forms of renewable energy should be welcomed to help reduce climate change.

Annex B

CHAIR'S INVITATION LETTER TO CONSULTATION

Cynulliad Cenedlaethol Cymru
The National Assembly for Wales

Pwyllgor Datblygu Economaidd
Economic Development Committee
Bae Caerdydd / Cardiff Bay
Caerdydd / Cardiff
CF99 1NA

Eich cyf / Your ref
Ein cyf / Our ref

25 April 2002

REVIEW OF ENERGY POLICY IN WALES
CONSULTATION ON RENEWABLE ENERGY REPORT

I enclose a copy of the Economic Development Committee's consultation report on renewable energy. This is the first report in the Committee's review of energy policy in Wales.

The Committee chose energy policy as the subject for its next review because a secure and competitively-priced supply of energy is crucial to economic development in Wales and for our industry to be able to compete in the world-wide economy. But it is also an industrial sector in its own rights. Wales is well endowed with energy resources and has a track record of manufacturing and engineering - and both of these are vital to energy production. There are now unprecedented opportunities to develop new technologies, for research and innovation, and for jobs. If Wales takes the opportunities it can place itself at the forefront of these developments.

We selected renewable energy as the first topic in the Review because of the perceived urgency associated with planning issues and with facilitating an early start to an enhanced renewables program. We hope that our report will stimulate a wide public debate on the subject of renewable energy and invites views from people and organisations within Wales - and more widely.

The Committee has made 6 recommendations on the policy issues we consider most critical. You may find it helpful to address your comments in relation to these. Could I please have your response by Friday 5 July.

We welcome responses in Welsh or English and these can be sent in hard copy or electronically.

Letters should be addressed to:

Gareth John
Committee Secretariat
National Assembly for Wales
Cardiff Bay
CARDIFF
CF99 1NA

e-mail responses should be sent to the Committee's electronic mail box:

Economic.comm@wales.gsi.gov.uk

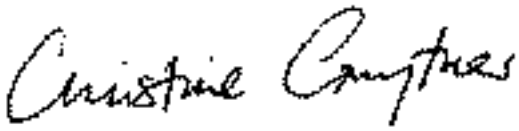
Further copies of the report are available on request from Gareth John on 029 2089 8429.

As part of the National Assembly's commitment to openness, we will place copies of written responses in the National Assembly's libraries and will make them available to the public on request. Please indicate if you wish your response or any part of it, not to be made publicly available.

If you need any further information please contact the Committee's Clerk John Grimes on 029 2089 8225 or its Deputy Clerk Sian Wilkins on 029 8029 8224.

I look forward to hearing from you.

Yours sincerely



Christine Gwyther AM
Chair, Economic Development Committee

Annex C

GLOSSARY OF TERMS FOR RENEWABLE ENERGY

The Glossary is arranged in alphabetical order for quick reference. The explanations given are necessarily brief.

Climate Change Levy – This is a levy imposed on all commercial and industrial users of gas and electricity and increases the costs of these fuels. The revenue from the Levy is recycled to business through reductions in National Insurance contributions; thereby reducing the costs of employment. Large users can reduce the Levy by entering into a voluntary agreement to significantly improve their energy efficiency. Fuels derived from renewable sources are exempt from the Levy; this provides a small incentive to renewable generators (0.43p/kWh).

DNC – **Distribution Network Companies** – These are the operators of the local electricity distribution networks. Previously the Regional Electricity Companies (such as Manweb and SWALEC) controlled the networks and sold electricity to customers. Those two functions have now been split (by Ofgem) into sellers and network operators or DNCs.

Embedded generation – Most electricity is produced at large power stations remote from areas of demand. Electricity from these power stations is transmitted, via the National Grid, to the local distributions systems. These local distribution systems have been designed to allow the transfer of electricity from the grid to consumers. Electricity generators that are connected to the distribution system (as opposed to connected to the main transmission system) are referred to as embedded or distributed generators. They cause a difficulty because now electricity flows in the distribution network can be in different directions. This requires modification to switch gear and control systems. Many renewables and CHP plants are embedded generators.

GWh – **Giga-watt hour** - . A GWh is a measure of energy. One GWh equals a million kWh (kilo-watt-hours) or 10^9 Wh. A 1MW device operating continuously for a year will produce 8.76 GWh of electricity.

IPCC – **Intergovernmental Panel on Climate Change -** An intergovernmental body established by the United Nations to collect and disseminate information on climate change.

NETA – **New electricity trading arrangements -** The new trading system is based on long term contracts between generators (producers of electricity) and suppliers (companies that sell to consumers). If either party to the contract is "out-of-balance" then they have to pay penalty fees. Thus if a generator produces less than contracted or a supplier sells more than contracted then they have to pay for the difference at a rate determined by the operator of the system (National Grid plc). To date the out of balance charges have been extremely high (twice the contract price). This unduly penalises intermittent generators since they cannot guarantee a level of supply. As a result CHP generators and renewable generators have been severely disadvantaged. Ofgem have recognised this and there is a working party looking at how to resolve the issue.

NFFO – **Non-fossil fuel obligation -** This was a scheme introduced to prepare nuclear power for privatisation. In the 1990s renewables were included under NFFO which provided a level of support for renewable generators through competitive contracts. There were five rounds of bidding (referred to as NFFO-3 etc) and approval was given to 933 projects with a combined capacity of 3639MW. However only a fraction of these have been actualised, only 47% of the contracts in England and Wales received planning permission. The contract prices for most renewables reduced significantly over the five rounds of bidding; for example wind power costs fell from 7p/kWh to about 2.5p/kWh.

NTS – **National Transmission System -** This is the name of the high capacity gas pipelines that are used to move gas around the UK in bulk. It is the equivalent of the National Grid in the electricity system.

Ofgem – **Office for regulating gas and electricity markets -** Ofgem is responsible for the economic regulation of all aspects of the gas and electricity markets. This includes establishing markets, setting performance targets, determining the return on investments and contracting arrangements. It was Ofgem that devised NETA.

PIU – **Performance and Innovation unit -** A unit established within the Cabinet Office to carry out studies on issues that cut across traditional departmental boundaries.

RCEP – **Royal Commission on Environmental Pollution -** . It produced an important document, "Energy – the changing climate", that called for 60% reductions in CO_2 emissions by about 2050 in the UK.

RO – **Renewables Obligation -** This is the replacement for NFFO for supporting renewable electricity production. The RO places an obligation on all suppliers to obtain a proportion of their electricity from renewable generators. The proportion will be about 3% in 2002 rising to 8% in 2010. A supplier can either buy electricity from a renewable generator and hence receive the necessary certificates (ROCs – see below), or can purchase ROCs from other suppliers or can pay Ofgem 3p/kWh for the unmet obligation. This effectively gives renewable generators a 3p/kWh premium over other sources of electricity. When combined with the Climate Change Levy (CCL) exemption the price suppliers might be willing to pay for renewables is 2.0p/kWh (wholesale price) + 3p/kWh (RO) + 0.43p/kWh (CCL exemption) = 5.43 p/kWh. At this price many renewables are economic. However not all these benefits will accrue to the renewable generator (the supplier will take some) and the current impact of NETA significantly reduces the value of intermittent electricity.

ROC – **Renewables Obligation certificate -** These certificates are the means by which a supplier demonstrates compliance with the Renewables Obligation to Ofgem. The certificates are tradable, which means that some suppliers might accrue more than they need and sell them to other suppliers who have insufficient. The buy-out price for the obligation is 3p/kWEh, so certificates are likely to have a value close to this.

TWh – **Tera-watt-hours -** A tera-watt-hour is a unit of energy. One TWh equals a thousand GWh (see above), a billion kWh (kilo-watt-hours) or 1012 Wh (watt hours). The UK as a whole consumes about 380 TWh of electrical energy per year.

Annex D

Persons and Organisations responding to the consultation

1. Cllr VP Sherlock, Bridgend County Borough Council
2. Cllr Ioan M Richard, City and County of Swansea (personal response)
3. Leonard Harrison
4. John Nicholson, bio-power
5. Bob Broughall
6. Terry Howell
7. Mrs M Thomas, Garw Valley Community Councillor
8. R G Westlake, Western Power Distribution Ltd
9. Enid Butler
10. Joanna Jones

11. W S Sands
12. Rolf Jucker
13. Lynn Marden
14. Dr John Etherington
15. C Colin Jones, Clerk, Garw Valley Community Council
16. Dr V C Mason, Council for the Protection of Rural Wales
17. Victoria Jane Collins
18. John Nicholson
19. B Hall
20. Sarah Hart

21. Dr M Reiter
22. T N Harper
23. Chris Neale
24. Doreen Parry
25. Angela Thomas
26. Dr V Trundle
27. Alun John Richards
28. Julian Rosser
29. Wendy Jones
30. (illegible)

31. Victoria Malcolm
32. Mrs Elizabeth Morley
33. A I Richard
34. Mr M H Evans
35. J G Evans
36. Louise M Griffiths-Richard
37. Ms C Jones
38. Mrs R H Williams
39. D P Davies, Prof of Child Health, University of Wales College of Medicine
40. Laurence Main

41. Mr E J H Nicholls
42. Edward Coleman
43. Mrs Jacquelyn Richard
44. Mr Rhidan Richard
45. Mrs Llinos Adere
46. Mr Ian Ball
47. Mr J P Cassidy
48. Mrs A Cassidy
49. Mr Phil Croxall
50. Dr Eirwen Gwynn

51. Mr Caesar Adere
52. Alan Phillips
53. Cllr Ioan M Richard, City and County of Swansea
54. Mrs Pam Barrate
55. Mr Andrew Stobart, A Ferrand and Associates
56. Mrs C Pilsbury, Organiser, Wales Broadbased Organisation
57. Bob Cherryman, Head of Energy Saving Trust, Wales
58. Nigel Adams, Head of Development Planning, Wales Tourist Board
59. Dr Iolo ap Gwynn
60. Keith Warren, Head of Planning and Economic Regeneration, Newport County Borough

61. Mr Trevor Astley
62. Mrs Cynthia M Hiron
63. Paul Spare
64. *(Regional Committee response)*
65. Dr Dafydd Huws, Amgen
66. Margaret Hunt, Secretary, Newport and Valleys Branch, Campaign for the Protection of Rural Wales
67. J O Robinson
68. David Fletcher, Pembrokeshire Coast National Park
69. Paul Beswick
70. J Marshall

71. Phil Kingston
72. Peter Southgate
73. K M Bowen
74. Sally Tansey, Forestry Commission Wales
75. Mr Lyn Jenkins
76. Dr Adrian Stallwood, South West Energy Efficiency Advice centre
77. David Foot
78. Sylvia Davies, Council for National Parks
79. Jan Cliff, Swansea and Llanelli Green Party

80. Jan Cliff, Sundance Renewables
81. Owen Rook
82. Mari Schmidhane
83. David Lewis
84. Sue Gittins, The Ramblers Association, Wales
85. Andy Bull, Powys County Council Directorate of Economic And Community Regeneration,
86. Peter Williams RSPB Cymru
87. *(Regional Committee response)*
88. Alun Williams
89. Alex Tindall, Innogy plc
90. Dilwyn Jenkins, Powys Energy Agency

91. Derek A Baggs, Electricity Association
92. Prof. P D G Thomas
93. Hazel Clatworthy, Monmouthshire County Council
94. Dan McCallum, Awel Aman Tawe Community Wind Farm
95. Mr & Mrs T A Rodgers
96. John Asquith
97. Mike Batt, United Utillities, Green Energy
98. Christopher Jessop
99. Lyn Owen, Environment Agency Wales
100. Ross Elliot, West Wales Eco Centre

101. Keith Davies
102. Russell Marsh, WWF Cymru
103. Dafydd Davies
104. Siân Hawkins
105. Catherine Bond, The House Builder's Federation
106. Ian Lucas MP
107. Simon Bilsborough, Countryside Council for Wales
108. Mrs Jackie Lewis
109. Mrs Eluned Elizabeth Richards
110. Gordon James

111. Steve Salt, West Coast Energy
112. Prof. John Farrar, Director, Institute of Environmental Science, University of Wales, Bangor
113. Jonathan Brown Wales Council for Voluntary Action
114. Prof F R Hawkes et al., School of Applied Sciences/School of Technology University of Glamorgan
115. Merfyn Williams, Director, Campaign for the Protection of Rural Wales
116. Cllr Brian Howells, Chairman, Pembrokeshire Energy Agency
117. William Evans
118. Debbie Dorkin, Environmental Services Association
119. DL & RM Evans et al,
120. Stephen Salt, Celtic Offshore Wind Ltd

121. Angela Kelly, chairman, Country Guardian
122. Peter Hinson, on behalf of British Wind Energy Assoc. BWEA
123. Mr J V J Jones
124. Dr Mark Legerton, National Wind Power
125. J S K Mainwaring
126. Pete West
127. Neil Crumpton, Friends of the Earth Cymru
128. Paul Allen, Development Director, Centre for Alternative Technology
129. Max Wallis, Friends of the Earth Cymru, local groups network
130. Dr Ruth Williams, Head of policy, The National Trust Wales

131. David Vincent, The Carbon Trust
132. Martin Saville, City and County Council of Swansea
133. C E V Gardener
134. Margaret Crellin
135. Lewis Lesley, Professor of Transport Science Liverpool John Moores University
136. Miss Eirwen Harry
137. Dr V C Mason
138. Andy Stevenson, Network Design manager, National Grid Company
139. Dr H K Little
140. David Morgan Jones

141. Gareth Hall, Welsh Development Agency
142. The Elan Valley Trust
143. Mrs H E J Pegg
144. Susan Robinson
145. Gail Chester
146. Rebecca Saunders
147. Mrs Hoy
148. Sylvia Brunsdon

The full responses are available on the internet at :

http://www.wales.gov.uk/keypubassemecodev/content/energy/responses/responses-index-e.htm

(or via the links from the Economic Development Committee home page on www.wales.gov.uk)