

MINCH MOOR

SCOTTISH BORDERS

WINDFARM INFORMATION SUMMARY JUNE 2003

BACKGROUND

Last year, it became clear that a number of wind generating companies were targeting the ridgeline above the River Tweed in the Walkerburn area, in the Scottish Borders. In Autumn, Walkerburn Community Council became aware that AMEC proposed to build a windfarm on the Minch Moor on Forest Enterprise land, very close to a village of 700 people, and on the Southern Upland Way, the major tourist trail in the area and the focus for a number of tourist ventures. Soon afterwards, Ettrick and Yarrow Community Council became aware that GreenPower planned a windfarm running from Broad Meadows onto the Southern Upland Way and along local riding trails. Innerleithen, Traquair and Cardrona Community Council had already been involved in the successful planning application for a windfarm at Bow Beat, which was regarded by most people in the area as an instance of sensitive planning.

The AMEC Planning Application was submitted to Scottish Borders Council in April 2003 and is likely to be considered at the July or August Planning Committee.

AMEC CONSULTATION

In their planning application AMEC make much of the level of 'consultation' undertaken with local residents, especially in Walkerburn which is the village closest to the proposed windfarm. Indeed, reading the application one is given the strong impression that there is complete local support. There has been very little consultation and there is very little support in Walkerburn.

In Autumn 2003, Walkerburn Community Council tried to get some specific information from AMEC because Walkerburn is a south facing village dominated by the ridge of the Minch Moor. AMEC gave a general presentation on windfarms to the Community Council in October 2002 stressing the environmental benefits but giving no details of siting.

On 17 January 2003, a team from AMEC visited the village with a presentation on their proposal. The event was well attended but it took the form of a few photographs, a strong visual sales pitch about AMEC and wind power and the opportunity to talk to some AMEC representatives. It was effectively an AMEC propaganda exercise. There was no opportunity for group discussion. (AMEC claim on their website that this very low key presentation was part of their public 'consultation').

The plan presented was for approximately fourteen 100 metre high turbines many of which would be directly within sight of most of the village and there was a rough plot. Everything was presented as having been already agreed – it was an information day not a consultation day - and there was no assurance that the windfarm would not expand further in future. AMEC leaflets were circulated – one resident even took a pile to the local Post Office so that more residents could see them and arranged for a report in the village newsletter. At no time has AMEC attempted to use the village newsletter for publicity or consultation.

The tone of the presentation worried many people especially since the windfarm site shown on the AMEC maps included high ground with access tracks on which no turbines were shown. AMEC has since sent, on request, photographs showing the visual effect on particular groups of houses. The photographs appear to make much use of wide-angle lenses (thus diminishing the apparent size of objects in mid-frame), white sky and grey or white turbines but the impact is still clear. AMEC has also produced 'visualisations: one householder wrote in February and was assured that no turbines were visible from their house but a March letter from AMEC showed 12 turbines visible from the same house, although only 3 showed more than rotor blades. AMEC also state that turbine sites have been constantly changed to take effect of local feelings and that the Minch Moor is relatively low in timber value and wildlife richness.¹ An AMEC official has also said that “the steep inclines in the Border Hills necessitate putting them (turbines) on the topes of hills”² in spite of the fact that there is another windfarm close to Walkerburn which is not on the tops of hills. (The same officer said “we get very little energy from wind” and “I’m not here to put up a windfarm if the people of Walkerburn don’t want it!”)

Walkerburn Community Council was becoming steadily more concerned. There was a perception in the village that AMEC were simply not interested in consultation and that, regardless of village concerns, there was going to be a large and visually obtrusive windfarm directly overlooking the village. Informal discussions with Etrick and Yarrow Community Council and with the neighbouring town of Innerleithen (Innerleithen, Traquair and the Glen Community Council) suggested that everyone shared concerns about the cumulative effect of windfarm development in the area. In particular, since the tourist industry locally relies on walkers, cyclists and horse riders, there was concern that a line of 100 metre turbines on, or highly visible from, the Southern Upland Way would be economically detrimental to the area. As a result, the 3 Community Councils decided to undertake a fact finding exercise in order to inform local debate. The fact finding exercise was entrusted to Community Councillors who were supporters, in theory, of wind energy since this seemed the best way to get a 'neutral' view of the proposed developments.

¹ Interview in The Peeblesshire 7 March 2003.

² Mr Ormiston 24 March 2003.

This briefing note is a summary of that exercise, which threw up some 400 unwieldy pages of information. In preparing the summary, inevitably, the AMEC proposal has been highlighted since AMEC has applied for planning permission. We understand that GreenPower will apply for planning permission over summer 2003 for a larger windfarm based on Broad Meadows and running along the Southern Upland Way.

CONTACT WITH AMEC

During Autumn 2002, Walkerburn Community Council was in regular contact with AMEC but little information was forthcoming. There was little local concern because most residents supported the aims of renewable energy development and felt that the Bow Beat windfarm had been sensitively developed in keeping with our environment.

However, the AMEC leaflet³ issued at their presentation in January 2003 began to ring alarm bells with Walkerburn residents. It states that their Minch Moor development will have:

- **Potential** to supply more than 14,000 homes – on investigation we found that, whilst there was the potential, conventional sources would not be replaced, merely duplicated. This is admitted by GreenPower in their leaflets. (One GreenPower representative tried to convince a group that power generated by the windfarms would go directly to Border homes – but was hastily corrected by another GreenPower official!)
- Important employment potential – but this is contradicted by the fact that there will only be 2 or 3 maintenance jobs at most covering more than one windfarm in the area, and these need not be local. A German company has set up an office in Peebles (managed by a German) to service Bow Beat and the potential string of windfarms on the Minch Moor. No mention is made of the potential loss of forestry jobs.
- Benefit for restructuring and improving forest and moorland habitats – for ground nesting birds. No mention of the impact of connecting power lines on birds or the disruption during construction especially as the site follows a valley which is a designated SSSI.

AMEC asked residents to send in a survey form attached to their leaflet indicating their support for the project. Most of those who replied accepted AMEC's word at the presentation that the turbines would not impact on the village or the Southern Upland Way and happily filled in the survey indicating support. AMEC's own figures show that they received 76 responses from the 3 communities they visited in January – the town of Innerleithen, the village of Walkerburn (20) and the village of Yarrow. Of these, 83% were in favour or tended to be in favour of the proposed windfarm but at a time when little information was available and everyone thought the turbines would be out of sight of the villages/town and away from the Southern Upland Way. Later a number of Walkerburn residents completed and sent in or handed to AMEC

³ AMEC leaflet 'Information relating to a proposed wind farm development at Minch Moor' Dec 2002. Copies available from WAG or AMEC.

representatives survey forms disagreeing with the proposal – but these seem not to have been counted by AMEC. Some residents decided to carry out their own survey in Walkerburn alone: there were 264 respondents of whom 29 supported the AMEC proposal and 235 were against it. These figures have been shared with AMEC who were dismissive.

On 24 March 2003 AMEC returned to Walkerburn at the request of the Community Council to answer questions about their proposal.⁴ Unfortunately this meeting was called at very short notice (9 days) and in spite of the Community Council attempting to let everyone know, very few people heard about it and only 52 villagers attended. However, after a lively meeting a vote was taken: 3 villagers abstained, one voted for AMEC (and has since changed his mind) and 48 voted against. AMEC's answers to questions were very non committal. Again, however, villagers were left with the impression that AMEC officials thought that the plan was a fait accompli.

We understand from AMEC that the route into the site has been agreed informally by Scottish Borders Council (SBC) planners. The planning application explains that the turbines themselves and most material will come from Leith, near Edinburgh to Peebles then via the A72 to Innerleithen. At Innerleithen many HGV will turn south across the River Tweed and along the 'back road' to Glenbenna, opposite the main part of Walkerburn, through the houses then up the forest track beside Glenmead Burn and up to Minch Moor. The heaviest and longest vehicles, however, will not be able to make this turn and will drive through the main shopping street of Innerleithen, through the middle of Walkerburn to a new turning circle on Forest Enterprise land at Thornylee. They will then drive back through Walkerburn and the Innerleithen shopping street before making a left turn south across the river.

AMEC figures show very heavy daily HGV traffic for at least 2 months and thereafter, regular heavy site traffic for between 8 and 12 months during construction. At the 24 March meeting, AMEC officials spoke about using the Tweed Bridge in Walkerburn as a light access route and an exit route for HGV but said that they would seek traffic calming measures because this route passes the village school at a very tight bend. This caused some wry amusement because the village has been trying to get traffic calming measures for many years!

The following is of interest:

- a. A string of windfarms either have been built or seem to be planned along the major long distance walking route, The Southern Upland Way. We have heard of 2 more companies planning to use the Minch Moor and have had sight of one planned map area which takes a windfarm to the west of the AMEC site towards Innerleithen, again impacting upon the Way and on mountain bike routes. GreenPower's proposed Broad Meadows site will have a number of

⁴ Meeting taped and also full shorthand record made by Action Group with the knowledge of the AMEC officials.

turbines on the Southern Upland Way and some which are very visible from the A72 at Clovenfords. We are told that this will not affect tourism. We do not believe this: there is a cumulative detrimental effect. Other EU countries believe that windfarms are better sited away from rural tourist areas. We note also the Visit Scotland Windfarm Report conclusion that the visual impact of windfarms was sufficiently negative to suggest that they should be placed away from areas popular with tourists. It is very hard to see how the landscape impact of windfarms can be mitigated on such a clear ridge line above the Tweed Valley Forest Park.

- b. In other European countries turbines typically must not be sited less than their total length from any public access, and there are strict safety guidelines. In the Netherlands, sites must be twice the rotor diameter from the boundary of roads, canals or walkways for safety reasons and the German instruction is 5 times the rotor diameter. (AMEC plan to use a German company to build and maintain the Minch Moor Farm). Windfarm sites in Europe are often fenced off for safety. An AMEC representative has said that there are no plans to fence off their site.⁵ There are very real health and safety issues. There are examples of breakages, fires etc on turbines.⁶ AMEC tells us that "To our knowledge there are no instances of any windfarm related injuries in UK. In our experience any turbine blade failures have followed the pattern of the failure of the blade at Blyth offshore where the blade broke, yet stayed intact."⁷ A GreenPower Representative suggested that turbine blades are subject to fatigue and have to be replaced regularly but assured listeners that there was no real danger to the public. European visitors may be less than impressed given their own countries' approach to windfarm sites! The Health and Safety Executive in Edinburgh confirms that there are no guidelines or safety instructions on windfarm siting but there are guidelines on the use of a 10 ft ladder.
- c. The Minch Moor dominates Walkerburn to the south. Walkerburn is a 19th century planned mill village with the houses built on a south facing slope allowing maximum southern exposure to living areas. The prevailing wind is from the South West, ie from the proposed windfarm site directly towards the village, and it swirls around in a square box shaped valley which magnifies sound from the south. It is not possible that turbines can be hidden from the village as many are to be sited either on the ridgeline itself or on the forward slope facing Walkerburn, nor is it credible that they will not be heard or that there will be no shadow flicker directly into people's homes. We hear forest vehicles and machinery on the Minch Moor. (An

⁵ E mail and letter Tom Brinicombe AMEC 21 March 2003.

⁶ AMEC quote a 1995 book 'Wind Energy comes of Age', by Paul Gipe as proof that there have been no accidents. Between 16 Jan and 12 Apr 99, 12 accidents involving 15 turbines were reported in Germany. Ice lumps with a diameter of over 6in have been measured falling from turbines and there are 'Danger Ice' signs at some UK windfarms. At Ovenden Moor the sign is 'Falling Ice'.

⁷ E mail Tom Brinicombe AMEC 21 March 2003.

AMEC spokesman said that the Minch Moor windfarm would be no noisier in the village than a burn from about 100 metres⁸, but a burn makes a constant sound while windfarm noise varies. A burn makes a natural sound while a windfarm makes an unnatural and mechanical sound.) We note that in the USA windfarms are to be sited in areas with little human visitation. We also note that people living close to existing windfarms in UK insist that they are noisy.⁹ (The noise heard standing underneath turbines, which is slight, is irrelevant – it is the downwind noise and the low frequency noise which will affect Walkerburn.)

- d. The Minch Moor is a 'shallow' peat moor and although Scottish Natural Heritage recommend that there should be no development on peat moors they consider that the loss of tree planting on the Minch Moor, which will encourage the black grouse, will be excellent environmentally. Germany, the Netherlands and Denmark are amongst those countries which would not permit such development. Even in Denmark, possibly the most advanced country in the world for wind energy, the guidance is that since wind turbines are highly visible the effect should be minimised by integrating them into existing industrial landscapes and ensuring that they conform to the local architectural traditions.
- e. Since the Moor is owned by Forest Enterprise, and since we understand that AMEC has the sole rights to develop Forest Enterprise land in Scotland, it has been an easy site to progress from the points of view of both the developer and the Council.
- f. There is an excellent network of Forestry tracks to the Moor and around the area which are capable, with some upgrading, of taking heavy construction traffic. It is therefore a cheap option for the developer, again regardless of environmental concerns. AMEC tell us that they will upgrade the Southern Upland Way but if it is to be closed for up to one year and then reopened as a footpath through a string of windfarms, we doubt whether this will compensate for the loss of tourism.
- g. We have no clear statement from AMEC on how or where the power lines will run from the windfarm site to the Yair electricity sub station, where they tell us the connection to the Grid will be made. AMEC say that the cables from the turbines to the site connection building will be underground but from the site connection building to the Yair a line of poles is likely. At the very least, we hope that planners will insist on underground cables along the whole route, but we understand that this is unlikely. Again, Scotland seems set to be willing to accept a higher level of visual pollution than our neighbours. Note that the planning application for the connecting

⁸ This statement is also made in the BWEA leaflet on Noise from wind turbines, June 2000.

⁹ Askam & Ireleth Parish Council Minutes state that their local windfarm exceeds noise limits, DEWI measurements at Nympsfield clocked 99dB(A).

line is separate from that for the turbines¹⁰, and according to AMEC, will be submitted later. We have also been informed by a GreenPower spokesperson that they have the sole right to use the sub station at the Yair and that it will be operating at capacity with the Broad Meadows development. It will be interesting to see what happens next. Will AMEC decide to run their transmission poles down the Glenmead valley to Walkerburn, in full view of the village and along a popular walking trail?

- h. A recent Danish study suggests that the impact of overhead power cables leading from windfarms has a great impact on bird mortality though the turbines themselves apparently do not have a great effect. However, the EU appears to believe that the turbines themselves affect birds and is set to cooperate with the Irish Government to exclude 14% of Ireland's total land area including many of the best sites for windfarms. Apparently, ground nesting birds such as hen harriers and black grouse, like to nest under turbines where they are safe from predators.
- i. Enormous craters dug into the hillside and filled with concrete are necessary to stabilize wind turbines, which is likely to affect the water table, erosion, and water run-off. At the 24 March 2003 meeting AMEC officials stated that they would remove the bases and all debris at the end of the windfarm's life but in their planning applications the bases will remain. We are also aware that AMEC is a major contractor on British Energy's nuclear sites. It is common practice for 'very low level' radioactive concrete to be 'rubblised' and used as ballast in new foundations. This is a good way of quietly 'disappearing' a problem. Turbines sit on very large concrete platforms.
- j. Nordex AG, a German company, has set up an office in Peebles and a storage facility in the Scottish Enterprise Borders units in Walkerburn, in anticipation of the massive developments planned in the Borders. They already maintain Bow Beat and expect to get orders for a number of other windfarms in the area, including on the Minch Moor. Nordex is expanding into countries such as Scotland and Portugal as growth slows in Germany and Denmark (closure of Danish production site announced on 25 Feb 03).

SCOTTISH BORDERS COUNCIL

Scottish Borders Council identified the Minch Moor as a Preferred Area of Search for windfarm sites in the December 1995 'Planning Framework for Wind Energy Developments'. The Detailed Policy Guidance in that document remains a material planning consideration. It has proven difficult to find out exactly how the preferred areas were identified and the extent to which elected members and/or officers were involved. AMEC are clear that they

¹⁰ Under the provision of Section 37 of the 1989 Electricity Act.

chose the Minch Moor because it is a cheap site to develop and a preferred site.¹¹ Both their representatives and those of GreenPower have said repeatedly that they were strongly encouraged to look at these sites although officers at SBC are equally clear that there was no such encouragement. The Scottish Borders Structure Plan 2001 - 2011 (approved by the Scottish Executive 12 Sep 02) gives an effective 'blank cheque' to developers in the Borders with the greater part of the Borders designated 'preferred'. However, Policy I20 sets out the following for the assessment of wind energy developments:

- The landscape character of the area, as guided by the Landscape Character Assessment,
- The Structure Plan's environmental policies,
- The impact of noise on residential developments,
- Interference with aircraft activity (don't try telling Walkerburn residents that military flying never goes near the Minch Moor!)
- A significant risk of 'shadow flicker' or 'driver distraction',
- Any unacceptable cumulative impacts.

We note that the principal aim of the current Structure Plan is to encourage growth which supports the development of a sustainable Scottish Borders community and within it the development of individual sustainable communities which:

- Have access to a range of services.
- Benefit from:
 - enjoyment of the Borders' countryside, rivers, woodlands and coast
 - a high quality level of natural heritage and biodiversity
 - new development which makes best use of resources, is well integrated with its surroundings, and is of a high quality, environmentally sensitive design
 - a high quality, safe and healthy environment, and
 - participate in decisions which affect them

The Structure Plan states that the two windfarms at Dun Law and Bowbeat will provide domestic electricity to over 70% of households in the Borders – the Council should check its facts since this is a misleading statement. Wind power is intermittent and in the foreseeable future will not provide power constantly to one household. It goes on to state that the Borders will be a net exporter of renewable energy, which is true since Scotland has an existing over-capacity, but again the statement could be misleading especially as it is likely that in the near future that the UK will become a net importer. The Structure Plan also states that cumulative impact has to be considered on a site by site basis. Surely the cumulative effect across the Borders ought to be taken into account especially as so much of the Borders economy depends on tourism, and, in the north, use as part of the central belt dormitory?

Our European neighbours have lived with and developed wind power for longer and to a greater extent than Scotland is planning but little attention

¹¹ AMEC officials statements 24 March 2003 Walkerburn Public Meeting.

seems to be paid either to the lessons learnt or to the rationale behind their current policies – we can find no similar situation in which the Minch Moor type of development would be permitted. And it is difficult to see how the current plans fit in to the aim of the Structure Plan, Policy I20 or to the Policy I19 on Renewable Energy which states that the Council supports the development of renewable energy sources that can be developed in **an environmentally acceptable manner**.

An AMEC official suggested that the Council had stated that turbines must not be visible from Traquair House, and from some other major 'landmarks'. We asked the Council to confirm what had been said and in his reply the Assistant Head of Development Control wrote, "At preliminary meetings (with AMEC) attended by representatives from this department, the Council's landscape architect and a representative from Scottish Natural Heritage, discussion on visibility and visual impact did take place and suggestions were put to AMEC. These suggestions were based on the possible visual impact of the proposal from a wide range of viewpoints and not merely from Traquair House."¹² We have been unable to ascertain what the "wide range" was but apparently 700 people living in Walkerburn did not count, in spite of the 1995 policy guidance which suggests that development should be avoided when there would be an adverse effect on 'the setting of, and prospects from, settlements' or 'any listed building'.

We understand that North Devon Council and Torrington District Council have commissioned the Energy for Sustainable Development to get into communities and advise them on all alternatives and find out what they want. Alternatives that suit the area, do not impose and bring revenue and jobs into the community. This might be a sensible way ahead for SBC.

Mark Townsend in the Observer of 2 June 2002 reported that the British Wind Energy Association had admitted that it was targeting Scotland because political support can get applications pushed through the planning process. Alison Hill, the spokeswoman, apparently said, "We will go where we are welcome. At the moment Scotland is very welcoming." Why? Because in Wales and England the cumulative effect of more than one windfarm in an area is leading to applications being rejected. In the period June 1999 to May 2000 over 26% of applications in England and Wales were rejected as opposed to just 2% rejections in Scotland.

ACCESS TO THE SITE ON MINCH MOOR

There will be major traffic disruption only during the year taken to build the site (loads of equipment and materials can be 5.5 m/18 feet wide or more) but there are a number of outstanding questions

- a. We understand that AMEC will pay to replace the car/bike park at Innerleithen bridge part of which we are told will have to be demolished to make the turn onto the back road possible for the heavy

¹² email from SBC Assistant Head of Development Control 28 Jan 03.

vehicles. Mountain biking for fun and competition is a rapidly growing tourist sport and the current park at Innerleithen is well used. There appears to be no discussion on compensation for the loss to local businesses in the Innerleithen/Traquair/ Walkerburn area during the year of the build. And afterwards there will be a need to retain the access route for the heavier vehicles to allow replacement parts to be delivered throughout the life of the windfarm. How will this fit in with the essential existing car park?

b. We understand that AMEC will upgrade the access road from the A72 in Innerleithen to the site, but have yet to have this confirmed. The public road between Innerleithen and Glenbenna, where the forest track begins, is not suitable at present for HGV and is generally used by residents and tourists alike for walks and cycling. Who will pay to restore this road after use by HGV?

c. The access through the houses at Glenbenna is narrow. There are young families and elderly people in these houses whose quality of life is going to be destroyed for the period of build. Residents have been told that AMEC will tarmacadam their driveways as an 'improvement' but not everyone thinks this will be an improvement.

d. At present, there is a network of walking, riding and cycling trails in the forest to the south of Walkerburn. The use of these trails will be heavily disrupted, if not suspended, during the construction phase and many will be damaged by HGV. Who will compensate local tourist businesses? Rebuild the tracks? And what happens to the riding trails once the turbines are in place – horses don't like turbines, although a GreenPower spokesman denied this completely.¹³

e. AMEC plan to use the road through Walkerburn, past the local school as one access/exit route. This is a very narrow road around two very sharp bends past a school where there is no room for a pavement. There have already been major problems for the school and subsidence reports in local houses because of forestry use of the road.

f. It has been very evident from the plans seen to date for both the AMEC and the GreenPower windfarms that the existence of the old drove road along this part of the Southern Upland Way has been a major factor in deciding where and how cheaply to install turbines. A new road will apparently be built alongside the old drove road. AMEC and GreenPower both suggest that this will be a recreational asset but not many hill walkers prefer a prepared, wide track to a pathway along a ridgeline.

g. Last, but not least, the A72 is already suffering major traffic problems at a number of points along the proposed site traffic route. In

¹³ British Horse Society recommends a distance of 4 times the height of the turbine from a National Trail: Wind Farms and Horses Advisory Statement 2003. GreenPower presentation Apr 03.

their planning application AMEC openly state that they have not yet carried out a full route survey. We have grave doubts as to whether their proposed route is feasible, even with police escorts for the heavier loads, without causing unacceptable disruption both to tourist and general traffic.

VISUAL IMPACT

Some people find wind turbines attractive but the AMEC plan will have massive turbines dominating a steep, low ridgeline (from 300 – 450 metres). This is a rural landscape that sells itself to tourists on the basis of its 'natural' and 'unspoilt' beauty. AMEC turbines will be highly visible from the A72 as will GreenPower turbines from the A72 at the village of Clovenfords. Tourist traffic by road tends to follow the Tweed, Yarrow and Ettrick valleys, and can not avoid seeing turbines on the ridges.

The industry tell us that wind turbines have been a feature of the cultural landscape of Europe for more than 800 years. This is an irritating and untrue statement for this part of Europe.

The turbines proposed for both Minch Moor and Broad Meadows are 100 metres tall unlike the 60 metre tall masts at Dun Law or the 75 metre masts at Bowbeat, for example, neither of which sites is close to a village. The Minch Moor turbines will be BIG and very close to the village – the nearest will be less than 2 miles from the **centre** of Walkerburn. We note that in other parts of Scotland there are guidelines that windfarms should be 10 miles away from villages and towns. AMEC tell everyone not to worry because the visual impact will be mitigated by 10 metre trees and the shape of the ground but these turbines dwarf our hills. We understand perspective.

EFFECT ON TOURISM

£1.7m of public money will be spent this year promoting tourism in the Scottish Borders. The annual income from tourism is about £152m and 6% of the working population of the Borders is employed in tourism.¹⁴

As far as we can ascertain no one has researched the cumulative effect of a string of highly visible turbines in an area of unspoilt upland scenery which attracts tourists precisely because it is "untouched by man". Hence the Continental view that wind farms should be built near centres of other industrial development, on land already contaminated by industry, or where there are large man-made structures which already dominate the landscape.

The development companies all quote a MORI poll commissioned by the industry association in Argyllshire which suggested that tourists don't object to windfarms and would like to visit one. This poll is considered by many to be discredited because of the tiny number of non-local tourists involved and because it covers the idea of windfarms in an area, not the visibility. It is also

¹⁴ CE and SBC budget 2003

important to note that there is still curiosity amongst people in Scotland about windfarms and a visitor centre would no doubt attract some immediate interest but most of our tourists come from areas where windfarms are not a novelty.

The general feeling amongst those locally who are engaged in providing tourism services is that the effect can only be adverse. The 2002 study carried out by VisitScotland covered reactions to the visibility of windfarms. 26% of visitors claimed that they would be less likely to visit an area with a windfarm, 38% felt they spoil the scenery and there was a general consensus that they should not be sited in tourist areas. 74% felt that windfarms were not an added attraction. Most tourists would prefer not to see a windfarm during their visit¹⁵ - that, we suggest, is the critical point.

Policy E22 of the Scottish Borders Structure Plan states that development proposals which are considered likely to have a significant and sustained adverse impact on tourism will not be permitted.

The Tweed Valley Forest Park, stretching from Peebles to Selkirk along the line roughly of the A72 and the Minch Moor, has just scooped a high commendation in the Dynamic Place awards which recognise excellence in the development of rural environments. The Park has been in operation for less than a year and is already playing an important part in attracting tourists. Scottish Borders Forest District Manager told the Peeblesshire News that "...the area is getting a huge reputation for its mountain biking, and the new walking trails are pulling in visitors from all over...The development of the Tweed Valley Forest Park is still in its early stages, but already it is contributing directly in terms of employment through small local businesses and the tourism revenue obviously has spin-offs for the local economy. The Forestry Commission aims to build on this and make the most of this fantastic area of the Borders."¹⁶ All our findings suggests that Mr Simpson is correct in his assessment of the Park's value as a tourist attractor. Innerleithen, in particular, is set to benefit as a pleasant shopping town in the heart of the Park and close to excellent mountain biking trails including a world standard downhill race area. The aims of Forest Enterprise sit uneasily however with their support for the AMEC, and presumably the other, developments along the Southern Upland Way. Quite apart from the impact once turbines dot the skyline of the Forest Park, the period during which the roads around the site and the construction area are out-of-bounds to bikers and walkers for safety reasons will impact upon the current drive to attract tourists.

A separate note on tourism impact is attached as an annex.

WIND FARMS AND HORSES

An increasing area for both tourism and recreation is horse riding along trails in the Borders. Unfortunately, horses tend to perceive danger in wind turbines, both visually and because of the low frequency noise. The natural

¹⁵ Visit Scotland Windfarm Report November 2003.

¹⁶ Quote from the Peeblesshire News 21 March 2003.

instinct of a horse when faced with perceived danger is flight which can lead to safety concerns for riders on trails near windfarms. The sudden appearance in the horse's line of sight of turning blades, shadow flicker on the ground, the starting up of the turbine if the wind builds up and the low frequency noise are all dangers to a horse.

The British Horse Society issued an Advisory statement earlier this year (2003) which recommends a minimum distance of 3 times the height of the turbine (300 metres) to the nearest equestrian route and in the case of a National Trail such as crosses the Minch Moor, a minimum distance of 4 times the height, ie 400 metres. AMEC and GreenPower would appear to be ignoring this advice. Of course, it is advice and not legally binding. Incidentally, the Turnpike Act of 1822 prohibited the erection of a windmill within 200 yards of a turnpike road in order to avoid danger to horses and riders – and that was just for ordinary windmills.

SCOTTISH NATURAL HERITAGE

Scottish Natural Heritage is a government body that works with Scotland's people to care for our natural heritage.

We understand that Scottish Natural Heritage in Feb 02¹⁷ suggested the following principles on the location of renewable developments such as windfarms:

- Development should be guided to landscapes which are already developed or visually man-modified and relatively close to centres of population. (The latter point hardly applies to the Minch Moor though it can be argued that Forestry over the past 30 years has 'visually modified' the landscape, but we now have a more enlightened approach to forestry. That last great impact on our environment happened without sufficient debate, and we got it wrong. It will be sad if an unenlightened approach to windfarm location repeats the mistakes for the next 25 years.)
- SNH should support development where it can be accommodated without significant adverse impact on the landscape character.
- The potential for a few very large windfarms within or relatively close to the Central Belt or major population centres should be explored.

We understand that SNH has written to the Planning Office objecting to the AMEC proposal and stating that they can not support the environmental assessment produced by AMEC.

ECONOMICS

There seems to be general acceptance of the fact that wind generation is not yet economically effective.¹⁸ On-shore windfarms as part of a renewable

¹⁷ SNH website and June 2002 Policy Statement 02/02.

¹⁸ E mail Scottish Executive Enterprise and Industry Division Dec 2001.

energy programme have been subsidised in one way or another everywhere in the world. Denmark, which produces 13% of electricity from wind power, has halted its programme of subsidy for wind farms on the basis that their wind farms are “the greatest economic and environmental disaster for [their] country” [Professor Bjorn Lomborg, Environmental Minister, Denmark]. Denmark has the highest unit cost electricity in the EEC – twice that of Scotland. Indeed, Denmark’s current wind power projects are offshore, as are the next generation wind power projects in the UK. Wind power will become more efficient, especially off shore, and other green technologies such as wave power may prove economic in the long run. We are worried that, in the rush to appear ‘green’, our politicians will leave us with an environmental disaster and cost the taxpayer a fortune in subsidies to companies which bring little to the local economy except during the construction phase.

According to the industry’s own publicity the wind turbine industry is now a 6 billion USD business employing approximately 50,000 people worldwide¹⁹. The goal is to increase wind energy’s share of total power consumption from 0.3% today to 12% by 2020 according to the European Wind Energy Association requiring a USD 630 billion investment.²⁰ **Industry sources suggest that companies building windfarms in UK can expect to gain a cash payback from their investment after 7 to 8 years and returns are in the order of 13/14% (on an IRR basis) making this type of investment very attractive.**

In March 2003, Powergen announced that it is investing £120 m in renewable energy sources, including wind turbines, in a bid to become the UK’s leading green electricity generator because they know that this will increase their profits.²¹

Germany’s E.ON-Energie AG estimates that wind energy drives up the cost of power produced in its conventional plants by about 1.5 cents a kilowatt hour. They project that the additional cost of using wind energy by 2011 will be between Euros 23 billion and Euros 51 billion.

Shares in wind energy companies such as Vestas A/S, NEG Micon A/S, and Nordex AG have declined as orders from those countries which lead in wind energy development have dried up. “This industry is in trouble” according to some fund managers. Why should this be in spite of US tax credits and subsidy regimes in most countries? Because the systems currently being put in place do not make economic sense and increasingly countries such as Germany and Denmark are aware of the environmental impact. So, are the companies now targeting more compliant governments, like Scotland?

Ofgem has apparently suggested to Ministers that power stations furthest from their customers should pay more to have their energy transmitted. Good economic sense since 10% of electricity is lost in transmission. But surely this will make it even less economic to site windfarms in Scotland for customers in

¹⁹ Danish Wind Industry Association 20 Sep 02.

²⁰ Report in Wall Street Journal Europe Jan 03.

²¹ Times 10 March 2003.

SE England? Ofgem also suggest that if the UK's targets to expand renewables are met, and all existing power plants run to the end of their projected lives, then the surplus capacity in electricity generation will grow from the current 25% over peak demand to about 60% in 2010.²² (GreenPower representatives tried hard at their public meeting in Caddonfoot in April to convince residents that the output from their windfarm would go straight to local communities first but found it difficult to explain how electric power in the grid could be so labled!)

The estimated cost of the link from the Isle of Lewis windfarm to Liverpool is apparently more than £450 million. Who pays? At present the taxpayer. The national network will have to be rebuilt and reinforced in order to cope with intermittent power from windfarms. The cost of this? That seems to be unknown by everyone.

Renewables can make a significant contribution to electrical energy supply but the intermittent nature of wind power means that windfarms cannot provide a reliable source of power. The Royal Academy of Engineering estimates that for every 22 GW of windpower installed, 16 to 19 GW of conventional plant capacity would have to be available to provide back-up at a cost possibly in the area of £1billion.²³

The intermittent nature of wind power also creates technical problems for the grid connection to the extent that many experts believe that the costs of upgrading and stabilising the grid mean that greater emphasis should be given to developing and deploying energy storage technologies.²⁴

An HSBC report on extracting value from renewables in the UK, published in early 2003, demonstrates why companies are interested in investing in windfarms but also suggests that for the tax payer and the consumer the economics are less rosy. Electricity suppliers are required to supply a percentage of their total sales from electricity generated from renewable sources. In 2002-03 the requirement is 3%, rising to 10.4% by 2010-11. To meet this supply obligation renewable technologies would have to achieve about 13 GW of installed capacity by 2010. Current renewable production cannot even meet the 3% target so anyone who can provide another source of renewable energy has a very ready market.

The Vestas wind turbine factory in Campbeltown received subsidies of £9m to create 100 jobs but is not being used to build the turbines for any of the local Minch Moor wind farms.

In April 2003, Scottish Gas wrote to its customers telling them that the cost of electricity was set to increase by 2.5% from 14 April 2003 because, "As part of the government's environmental policy, we are required to increase the amount of electricity we supply from renewable sources". This would make

²² Callum McCarthy, Chief Executive Ofgem, quoted at a 2002 Power Industry Conference.

²³ Royal Academy of Engineering Appraisal of the Policy and Innovation Unit's Energy Review August 2002.

²⁴ Ibid.

more sense if there was not a surplus, if the wind generated electricity could be used efficiently in a redesigned national grid and if some conventional sources could shut down.

The Scottish Renewables Obligation levy is used to compensate Scottish Power for being obliged to buy more expensive renewable energy. It is expected to cost £15m to the year ending 31 March 2002²⁵.

WHY SO MUCH GOVERNMENT SUPPORT?

Windfarms are privately funded at installation so appear 'good' economically for the tax payer especially as the subsidies for production are paid for by the consumer, ie the tax payers.

Windfarms are a highly visible display of commitment to renewables and 'green' issues. They are a 'good thing' in PR terms. A more cost effective and energy saving measure would be to improve house insulation but that would not look good on the front pages.

Windfarms are the simplest and easiest way for the electricity generators to meet the arbitrary targets for providing supplies from renewables so the government really has to support them or admit that its targets are hopelessly wrong.

NOISE, HEALTH AND SAFETY

There are 2 potential sources of noise from a wind turbine: mechanical noise from the gearbox or generator, and aerodynamic noise from the rotor blades. We are told by the industry that mechanical noise has **virtually** disappeared due to better engineering. Manufacturers try to ensure a smooth surface on rotor blades and care is taken not to damage blades during installation in an attempt to cut down aerodynamic noise.

Wind power companies suggest that the turbines 'whisper', in the decibel range of about 35 db each when the wind is at lower speeds, louder under other circumstances and dependent upon the gear and its mechanisms. However, factors other than decibels must be considered when measuring the impact of noise from turbines:

- ◆ The larger the turbine the higher the noise levels, and these turbines are among the tallest, the blades alone measure 66 metres in diameter.²⁶
- ◆ Placement of the turbines also affects how sound travels, and placement on a high ridge is ideal for 'broadcasting' the noise over a wider area, especially given the 'box' shape of many Borders valleys such as that at Walkerburn.
- ◆ In areas where there is constant background noise, the sound of turbines is not as intrusive. Happily, this is a tranquil, very quiet area, with

²⁵ Electrical Review May 2002.

²⁶ AMEC figures.

little background noise, which makes noise easily discernible. Indicative noise levels for a rural night-time background given by the British Wind Energy Association are 20-40 aB(A) and of a windfarm these are 35 – 45 aB(A)²⁷. This will change our environment.

- ◆ The sound produced by a wind turbine is not constant; it is rhythmic, with a 'thwump' as the blades rotate. This also adds to its intrusiveness.
- ◆ People living as far as 2 km and perhaps further will hear the turbines, and those living closer (Glenbenna and the back road) will live with the noise of what has been described as an old boot tumbling inside a dryer – 24 hours a day, every day.
- ◆ The BWEA, and AMEC, state that the noise of the wind masks turbine noise when it is very windy. The DTI disagrees, "The assumption that background noise increases with wind speed is not necessarily true in hillier regions"²⁸.
- ◆ According to research on low-frequency noise, which is the type of noise generated by wind turbines, 'the effects of low-frequency noise are of particular concern because of its pervasiveness ... and reduced efficacy of many structures (dwellings, walls, and hearing protection) in attenuating low-frequency noise compared with other noise ... Loudness judgments and annoyance reactions are sometimes reported to be greater for low-frequency noise than other noises for equal sound-pressure level' [Berglund B, Hassmen P, Job RF. Sources and effects of low-frequency noise. Journal of the Acoustical Society of America 1996 May; 99(5):2985-3002]. So, typically out of doors people can not detect low-frequency noise from a wind turbine but the natural resonance in houses means that the noise is amplified inside at a higher, audible frequency. This is the 'noise' usually complained about by people who live near windfarms.
- ◆ A whisper is rated at 30 decibels.

We are told that noise levels from windfarms in Denmark have halved in the 3 years to 2001 but we are also assured by Danish groups living next to windfarms that this still means a lot of noise if you live downwind – the low thump-thump-thump is said by many people who live within 2 to 3 miles of windfarms to disrupt sleep and cause stress²⁹. (Walkerburn is downwind of the Minch Moor site). The answer from the wind industry suggests that noise toleration is subjective, eg people live beside busy roads.

"More and more people are describing their lives as unbearable when they are directly exposed to the acoustical and optical effects of windfarms. There are reports of people being signed off sick and unfit for work, there is a growing number of complaints about symptoms such as pulse irregularities and states of anxiety, which are known from the effects of infrasound (sound of frequencies below the normal audible limit)" The report behind this statement by the German Professors Initiative Group, published in the Darmstadt Manifesto, has been partly responsible for the tightening up of distance limits between windfarms and settlements in Germany. There are

²⁷ BWEA Noise for wind turbine The Facts, June 2000.

²⁸ The Assessment and Rating of Noise from Windfarms, DTI ETSU-R-97.

²⁹ Example report by Alexander Garrett in the Observer 2 Mar 03.

similar findings from USA, Denmark and the Netherlands.

SIGNAL INTERFERENCE

We are told that wind turbines can interfere with television signals in buildings up to 10 km away. Mobile phones, radios, and other electronic equipment are also subject to interference. However the British Wind Energy Association says that it can be readily fixed. In 1994 the BBC and ITC recommended that developers should pay the costs of such 'fixing'. AMEC deny that this is a problem. GreenPower accept that it is and promise to take action to alleviate it at the proposed Broad Meadows site.

BAA believe there are some dangers to radar from large wind turbines but we have assumed that Minch Moor is far enough away from a major airport for this to be irrelevant. It is not mentioned in the AMEC planning application, however, and should be checked.

GREEN ENERGY

A huge amount of emphasis is placed by AMEC and others involved in wind farm development on their 'green' credentials but there are a number of important points which are seldom mentioned:

- Fuel cell technology is expected to become more effective in the next two decades making hydrogen production, storage and delivery systems effective for electricity generation. This will provide a constant source of power rather than the intermittent variety provided by the wind.³⁰
- There is an argument that research and development into alternative power is reduced because suppliers can claim green credentials thus avoid pollution levies and gain credits whilst using an inefficient system such as windpower.
- Electricity generation currently accounts for 28% of the country's CO2 emissions. There is an urgent need to consider policies which lead to cut backs across all CO2 emissions. The Royal College of Engineering suggests that the actual amounts of carbon dioxide emitted should be the basis for any Climate Change Levy rather than the current system which is based on energy used and the origin of that energy thus encouraging inefficient use of windpower and rapid development of windfarms regardless of real green or economic effects. We need to encourage energy efficiency and fuel switching to genuine low carbon alternatives.
- The UK produces about 3% of reported global CO2 emissions. There is an argument for helping developing countries clean up their act. The Clean Development Mechanism within the Kyoto Protocol is specifically designed to encourage this type of investment. And this is likely to

³⁰. Royal Academy of Engineering Appraisal of the Policy and Innovation Unit's Energy Review August 2002

have a far greater impact on world CO2 emissions than expensive windfarms in the Scottish Borders.

- The manufacture of cement from chalk or limestone involves a chemical reaction in which carbon dioxide is given off at a rate of 500 kg/tonne. The cement industry is responsible for 8-10% of the global total of CO2 emissions. And wind turbines require huge cement bases.
- It is estimated that it takes about 6 years to 'pay back' the CO2 emissions used in manufacturing turbines.
- The USA currently generates 8% of its total power from renewables, mostly from hydro and biomass. Wind provides just 1% of that 8%.
- The rate of CO2 accumulation in the atmosphere over the past 2 decades has stayed the same or decreased slightly according to Science Magazine last year.
- Off-shore wind turbines are 20% more efficient than on-shore and the 3 large areas planned by the government have the potential to supply all our needs so why dot the countryside with turbines?

Scotland has already met the government's targets for green generation through the use of hydro-electricity. All the windfarms will do is help the Scottish Executive and the UK government meet higher targets for the amount of generating power from renewables. They will not cut our CO2 emissions so it is difficult to understand the claim that their existence helps climate change, global warming or anything else.

There are conflicting reports on the impact of turbines on bird life. A recent DTI report complains both of a lack of proper data and the poor quality of what we do have in UK.

TECHNICAL NOTES

No one in the three Community Councils is an expert but we have gleaned the following from open sources:

- The average turbine produces only 25% of its theoretical capacity. To guarantee continuous supply, 100% of its capacity has to be duplicated by more conventional forms of power generation. Wind turbines usually start operating at wind speeds of about 4 to 5 metres per second, reach maximum power at about 15 metres per second and close down at 25 metres per second. The blades are often kept rotating even when electricity is not being generated as a safety measure. The Scottish Executive's Energy Division characterises windpower as intermittent and states that there would be an increase in generation from other sources to compensate. They also state that it is unlikely that renewables generated electricity will replace some conventionally generated electricity. The supply companies buy the green electricity while maintaining generation from conventional power stations. The statement often made by the industry that a 1,000 KW wind turbine will displace annually 2,000 tonnes of carbon dioxide from other sources, eg coal fired power stations, is misleading since it will

not displace any at present. Nuclear power is, of course, as clean as wind power in terms of production and does displace other sources!

- The expected lifetime of the average wind turbine is 120,000 operating hours.
- Met Office wind data suggest that mainland UK is not ideal for wind generation. A hypothetical wind power capacity of 7,300 MW installed throughout the country would give a likely output nationally of less than 200 MW.³¹
- Modern turbines only require maintenance checks. They do not create more than 2 or 3 jobs locally because one small team will service a number of windfarms, and the maintenance contractors in Scotland are typically German companies who use their own staff.
- Turbines generally have to be spaced between 3 and 9 rotor diameters apart in order not to shade one another too much. This is why windfarms typically have to be strung out so widely and become so visually obtrusive unless great care is taken with siting.
- A single aluminium works uses 220 MW, more than is produced by every existing turbine in the UK.
- According to the Scottish Executive's Energy Division (Jan 02) Scotland has a surplus of generating capacity and exports 25% to England and Wales.
- There is currently very limited potential for 'electricity storage'. Fuel cell or chemical storage will eventually become available, but at a cost. This creates a problem now for wind generation because the excess available potentially when the wind is blowing can not be stored for use in peak times when it is most needed and the occasional over-capacity pumping into the grid can cause instability especially given the current infrastructure in Scotland.

MORE INFORMATION?

A Useful Website list is attached.

WHAT NEXT?

Walkerburn Community Council opposes the AMEC proposal as do our local MSPs. Notes on the Walkerburn objections are on the Walkerburn Web Site. Protest groups have been set up in Walkerburn, Traquair and Yarrow and Christine Grahame MSP is taking a petition to the Scottish Parliament. We ask everyone to make their own minds up and, if they wish to object, write now to: Head of Development Control, Scottish Borders Council, Council Headquarters, Newtown St Boswells, TD6 OSA.

This note will be updated on a monthly basis. If you want a personal copy, please contact your Community Council Member, Denise Hanks, Stoneyhill, Walkerburn EH43 6AA or Colin Kerr, 75 Tweedholm Avenue, Walkerburn EH43 6AP. Email copies from www.walkerburn.org.uk.

³¹ Royal Academy of Engineering Appraisal of the Policy and Innovation Unit's Energy Review August 2002

THE MINCH MOOR WINDFARM

NOTES ON TOURISM

AMEC claim that their proposal will enhance tourism in the area: in fact it is more likely to damage tourism.

AMEC claim that 'interpretative boards' will attract people to the area. There is no detail about where these notice boards might be placed but it is difficult to envisage a layby on the A72, for example, with a few notice boards attracting more tourists.

Tourists come to this area for peace, quiet and the rural landscape. Evidence from informal polls held by our local hotel and some Bed and Breakfast businesses suggest that Europeans in particular will avoid the area if windfarms are visible. In particular they are likely to avoid areas where they can see windfarms from their accommodation.

Tourist sites linked to windfarms quoted by AMEC are either old (Delabole figures are from 1991) when windfarms were still a novelty, from sites where local interest flourished for a short time after construction or from failed enterprises (Swaffham) where lack of tourists led to financial difficulties even when the centres were in rather boring countryside!

Industrial interpretation sites such as those at nuclear plants on which massive amounts of PR money are spent, do continue to draw visitors because of their novelty. Windfarms are not novel to European tourists and increasingly not to UK tourists.

In the year of construction, extra traffic, noise and the inevitable sound effects echoing down the valley are unlikely to encourage tourists to linger – or to return. AMEC carefully fail to mention this problem.

MORI STUDY

AMEC claim that a MORI study proves that windfarms are not detrimental to tourism. This claim is based on extremely flimsy evidence which is flatly contradicted by a subsequent VisitScotland study which is carefully ignored by AMEC.

In September 2002 MORI Scotland conducted a study into tourist attitudes towards windfarms on behalf of the industry lobby groups Scottish Renewables Forum (SRF) and British Wind Energy Association (BWEA). The survey is based on the views of a sample of tourists in Argyll and Bute, and was published a few weeks before VisitScotland's survey.

The aim was stated as, "...to assess tourists' awareness and perception of windfarms in the area, to help answer the questions about how wind farm developments might affect tourism in Scotland."

The sample poll of 307 people was conducted in Tarbert, Inverary, Oban, Cambletown and Lochgilphead on the weekends of 21-23 and 27-29 September 2002. This contrasts with a System Three survey of tourist attitudes covering 2,010 visitors at 20 sites conducted in Argyll and Bute in 1999. The latter survey was conducted between 10am and 8pm and interviews were rotated through days of the week thus is likely to be more representative of tourist views, especially since weekend interviews are more likely to catch day visitors from the central belt. Indeed the MORI poll does not distinguish visitors by place of residence whilst the System Three poll does so and deliberately excludes 'local' residents. There are almost twice as many 'first visit' responses in the System Three poll as in the MORI which is a statistically significant discrepancy and calls into question the validity of the MORI results.

In similar fashion, MORI report that 10% of visitors are attracted by music festival/playing in a band whereas the similar question in the System Three survey found 1%. Presumably because MORI polled visitors to a music festival as opposed to the normal run of tourist. Indeed, the MORI survey results are highly biased towards urban activities such as music festivals and pubs suggesting strongly that, because of the restricted timing and geography of interviews linked to the fact that day trippers and locals were not identified, the results are not representative of tourist attitudes.

The MORI poll is quoted by AMEC in support of the assertion that the wind farm development on the Minch Moor will be good for tourism. It is appropriate to note that only 122 respondents in the poll were aware of the existence of wind farms in Argyll and Bute (these are not highly visible such as AMEC's proposed farm) and only 60 respondents had seen a windfarm. 80% of those polled had not seen a windfarm and 60% were not aware of windfarms and had them pointed out on a map. It is difficult to argue that any credence should therefore be given to the argument based on these results that windfarms do not have a detrimental effect on tourism.

VisitScotland Study

During July 2002 VisitScotland conducted a nation-wide survey of visitor attitudes to windfarms. Locations were chosen based on their proximity to existing and planned developments. Quotas were set to ensure that there was a balance of staying visitors vis-à-vis day trippers, overseas vis-à-vis Scots and other UK visitors, and 'active' countryside visitors as opposed to those who were more 'passive' in nature. 46% had seen a windfarm in Scotland. 78% were on holiday 'away from home'. 73% were sightseeing by car or coach, 61% were 'passive' visitors whilst 16% went hill walking with 24% going for long walks. The beautiful scenery emerged as the key influencer in persuading people to visit: 81% said this was particularly important in deciding to visit an area. Nature and wildlife (48%) and unspoilt environment (48%) also featured strongly. 61% said that the chance to experience unspoilt nature was very important whilst a further 34% described it as quite important. 71% described lots of trails and walks as an important element of the appeal of countryside areas.

Summary Table – Proportion of Respondents claiming that each facility/development detracted from their experience (%):

Electricity pylons and wires	51
Mobile telephone masts	35
Quarries	33
Planted, geometric forestry	32
Windfarms and turbines	29
Telephone wires and poles	29
Hydro electric and other power stations	22
Fish farms	20
Hydro electric dams	12
Chairlifts/gondolas on mountain sides	9

Useful Websites

Companies Involved in Wind Generation

British Wind Energy Association	www.bwea.com
ENXCO	www.enxco.com
National Wind Power	www.natwindpower.co.uk
Offshore Wind Farms Industry Site	www.offshorewindfarms.co.uk
ECOTRICITY	www.ecotricity.co.uk
AMEC Borderwind	www.borderwind.co.uk
GreenPower	

Government Sites

US government energy site	www.eren.doe.gov
Scottish Enterprise	www.se-energy.co.uk
DTI	www.dti.gov.uk
Scottish Executive	www.scotland.gov.uk
Efficient Development of Offshore Wind (ENDOW) EU funded academic/industry research project	www.risoe.dk
US Environmental Protection Agency	www.epa.gov
US National Wind Coordinating Cttee	www.nationalwind.org
California Electric & Magnetic Fields Programme www.dhs.cahwnet.gov/ehib/emf	

Media

BBC	www.news.bbc.co.uk
New Scientist	www.newscientist.com
US Foundation for National Progress	www.motherjones.com
Intl Workshops on Transmission Networks	www.ekc.kth.se
Guardian article www.politics.guardian.co.uk/green/story/0,9061,726410,00.html	
Article about Skye farm www.igreens.org.uk/skye_wind_farms.htm	
Page dealing with noise levels from Wind Farms http://www.hayesmckenzie.co.uk/publications.html	

Miscellaneous Information

Centre for Alternative Technology	www.cat.org.uk
Individual Environmentalists	www.lgreens.org.uk
Ramblers Association	www.ramblers.org.uk
Friends of the Earth Scotland	www.foe.scotland.org.uk
NoiseNet (Commercial advice on noise)	www.noisenet.co.uk
Noise Abatement Society	www.noiseabatementociety.com
US Cato Institute (Liberal Think Tank) "Renewable Energy: Not Cheap, Not Green"	www.cato.org/pubs/pas/pa-280.html

British Horse Society www.bhs.org.uk
BHS article <http://www.bhs.org.uk/AccessLeaflets/Access20.htm>
Problems of Wind Power www.ncpa.org
Friends of the Earth
www.foe.co.uk/campaigns/climate/success_stories/welsh_wind_farms_to_go.html
Technical article from Robert Gordon's University
http://www.rgu.ac.uk/files/renewable_windfarms.pdf
ISVR Consulting Report <http://www.isvr.co.uk/environm/windfarm.htm>
Giles Gilchrest MEP www.gileschichestermep.org.uk/

April 2003 Example of rotor and mast breakage in Germany www.gemeinde-reinsberg.de/tipps/aktuell_2.htm

Protest Groups

Irvine Community Council www.vindsoft.co.uk/windfarm.htm
Rimside Moor Protest Group www.wind-farms.co.uk
US Protest Group www.elltel.net
Danish Society of Windmill
Neighbours www.naboertilvindmoller.dk/index_uk.html
MAIWAG www.windfarm.fsnet.co.uk
Cefn Croes Action Group www.cefnCroes.org.uk
US Anti Windfarm Group www.windpowercons.com/index.htm
Alliance to Protect Nantucket
Sound www.saveoursound.org/moreoffshore.html
Keep Galloway Beautiful kqboscot@aol.com
Bradworthy Lobby Opposing Turbines
Views of Scotland
Denbighshire Against Rural Windfarms hendrefarm@aol.com
S Holderness Opposes Windfarms Bernard.jull@ntlworld.com
Cotswold Protection Group Peggy.Liford@care4free.net
Skye Windfarm Action Group info@sw-ag.org
Eaglesham Windfarm plantserve@aol.com