

# NATIONAL RENEWABLE ENERGY POLICY

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## WHAT OTHERS THINK ABOUT WIND POWER

There are different ways that public opinion may be canvassed on issues such as the development of wind power. This sheet gives some suggestions on two of them.

### 1. SURVEY

A popular way of gathering information on peoples opinions on particular issues is to carry out a questionnaire. However, although an undoubtedly valuable method, a great deal of thought needs to go into compiling a successful one.

Questions must be carefully worded to avoid leading respondents to answer in a particular way. They must be 'open' questions which allow a range of different responses. They must also be clear and unambiguous.

When compiling a questionnaire you should remember that the responses need to be evaluated and therefore need to be recorded in a form which is easy to analyse. Pre-coded questions, with a range of responses including an option for any others not mentioned, are a way to deal with this - e.g.:

What will be the visual impact of the wind turbine on the landscape?

- a) ugly, an eyesore
- b) blend in well
- c) noticeable but attractive in its own way
- d) other (details please)

The following asks the same question but in a way that leads the response to a preferred answer.

What will be the visual impact of these intrusive wind turbines on the beautiful landscape?

Who to give the questionnaire to is an important consideration. Too large a sample and the analysis is too complex and time-consuming, too small and the results are insignificant. The people asked should represent all categories whose views on the issue are important.

Finally, it is sometimes a good idea to supplement questionnaire results with a few in-depth interviews with 'key actors' i.e. people whose views you consider to be particularly significant for some reason. Again the questions need to be thought through very carefully beforehand, with a clear view of what you want to find out.

## 2. DISPLAY

This method of canvassing public opinion may work best if there are a number of options or proposals under consideration.

Details of each may then be displayed, presented in a varied and interesting manner. The display may then be open to the general public or you may wish to invite specific individuals and groups. Visitors to the display may then be asked to assess each proposal by way of an evaluation sheet which is then analysed. This sheet needs to be planned very carefully to ensure that it gives the information required. It also needs to be very clear to the respondents what they are expected to do.

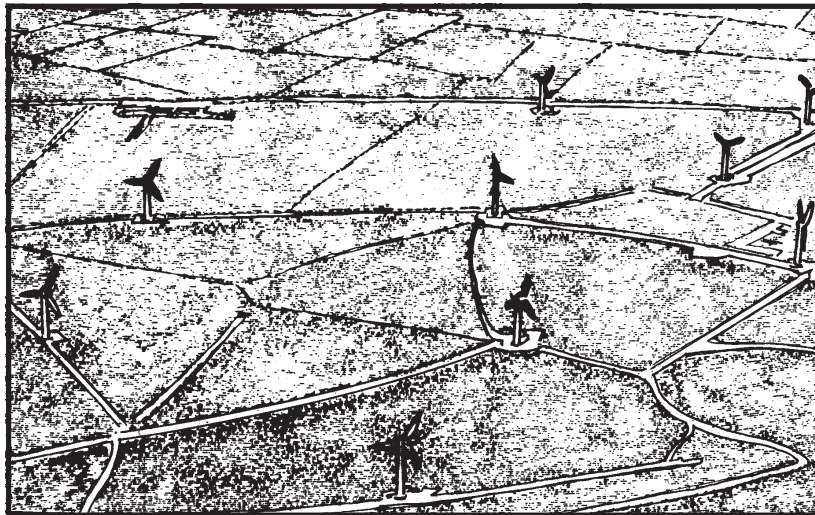
E.g. For each proposal you are asked to give a rating, using the table given, for the factors identified here. Do not worry about the Total column - this will be done later.

**Rating scale**                    1 - 2 - 3 - 4 - 5  
*excellent*                    *OK.*                    *very poor*

	Start up costs	Running costs	Visual impact	Noise	Total
Proposal 1	2	1	4	3	10
etc.					

# POWER FROM THE WIND

Power from the wind is a rapidly growing source of renewable energy in the UK. The first wind farms (groups of wind turbines) were constructed in 1990. By 1993 there were over 40 wind farms all over the UK and by the year 2000 there should be over 300. Wind farms only produce electricity when the wind blows - it is usually assumed that this is about 40% of the time. Therefore a wind farm with an installed capacity of 4000 kW would effectively have a capacity of only 40% of this i.e. 1600 kW - this is called its declared net capacity. It would take 750 wind farms with a declared net capacity of 1600 kW (as shown below) to generate as much electricity as a big coal or nuclear power station. This shows that wind power is a diffuse source of energy.



Delabole Wind Farm, Cornwall

The best sites for wind farms in the UK are on high ground or coastal sites on the western side of the country. Sites are always away from buildings, usually in rural settings as shown here.

The local impacts of wind farms and particularly their visual appearance excite great controversy among people who live or use the countryside near a wind farm. There are a number of other local impacts such as noise, interference with radio and TV transmissions, safety etc. In choosing sites for new wind farms it is necessary to decide:

- Which are the most critical impacts?
- How can you weigh each impact against another?
- Are there impacts which would make a developer look for a different site?
- Which impacts matter most to people living around a wind farm?

In assessing where to site wind farms it is also necessary to balance the global benefits of clean energy against the local impact on the environment. Is the 'destruction' of a local beauty spot less important than the global requirement to produce clean energy?

## KEY POINTS

- Wind farms produce clean energy but many will be needed to generate as much energy as a conventional power station.
- Wind farms are becoming a fairly common feature in the countryside - how should we judge the impact on people living and using the countryside?

## VISUAL IMPACT CASE STUDY

**Student Task**

The visual intrusion of wind farms is thought by many to be the most serious environmental impact of their development.

Using the Delabole wind farm in Cornwall as an example, your task is to decide whether this viewpoint is valid.

You have been provided with a summary of the environmental impact statement for the wind farm at Delabole prepared by the developer, an extract of a public opinion survey and some newspaper articles about wind farms in general. You should study this information carefully.

Using the information provided you should:

- decide if the developer has included all the factors that should be considered in the environmental impact statement (EIS)
- with each factor, decide what would be a worst case example for siting a wind farm anywhere in the country (include any additional factors that should be added to the EIS). For instance with the archaeological impact, building a wind farm next to an internationally important site, like Stone Henge would be the worst case example. On the chart provided score each factor for Delabole wind farm on a scale of 1-10, assuming the worst case example would have a score of ten and no adverse impact has a score of zero.
- now weight the factors examined in the environmental impact statement against the factor of visual intrusion. If visual intrusion has a weight of 5 what score would other factors have. A weight of higher than five indicates that you think a factor is more important than visual intrusion. A score of under five indicates that you think a factor is less important than visual intrusion. The score given in the previous section multiplied by the weighting given in this section gives a figure for the adverse impact. You should use the attached chart to record your results. With each factor on the chart you should provide a justification for the weighting you have given to it.
- you may wish to produce a mock up of how the wind farm looks from a particular viewpoint. The maps and diagrams provided in the Environmental Impact Statement should enable you to do this.
- finally summarise your findings on the relative importance of visual intrusion against other environmental impacts using Delabole to illustrate your points.

**Adverse environmental impact of the Delabole Wind Farm**

<b>Factor</b>	<b>Worst Case Example</b>	<b>Score</b>	<b>Weight</b>	<b>Total</b>
<b>Construction and access</b>				
<b>Land Use</b>				
<b>Visual Impact</b>			5	
<b>Noise</b>				
<b>Interference with TV Transmissions, Radiowaves and Microwaves</b>				
<b>Wildlife</b>				
<b>Safety</b>				
<b>Polluting Emissions (see note below)</b>				
<b>Archaeology</b>	Siting next to internationally important archaeological site			
<b>Decommissioning</b>				

Wind farms produce no polluting emissions and they may displace polluting energy sources - so this is a positive rather than an adverse impact - you will need to decide how to reflect this in the score and the weighting.

**DELABOLE WIND FARM - SUMMARY OF ENVIRONMENTAL IMPACT STATEMENT**

**Description**

The proposed wind farm will consist of ten 400 kW wind turbines which in total could generate ten million kWh of electricity per year. Each turbine will be mounted on a tower 25-30 metres high and will have twin blades with a 16.5 metres radius. The foundations for each tower will be a concrete pad, 6 metres in diameter and 1.5 metres in depth. The wind farm will be connected to the electricity grid by an underground cable to the sub station at "The Barton". The location of the wind farm is shown on map A.

**Construction and access**

During construction, lorries, cranes and diggers will gain access to the site through existing gates from the B3314. A landrover and a tractor will be used for operation and maintenance as no part of the turbines weighs more than four tonnes. Each turbine has a winching mechanism at the top of the tower enabling spare parts to be picked up or set down.

**Landuse**

The proposed site of the wind farm is grade 3 agricultural land currently used for grazing cattle and sheep. This use will continue after the windfarm is constructed as each wind turbine will only take up ten square metres of land. The site is near the village of Delabole and the Delabole slate quarry in an "Area of Great Landscape Value" (this status indicates that the landscape is of regional importance).

**Visual Impact**

The turbines will be grey in colour, their size and appearance in comparison to an electricity pylon is shown in Diagram 1 attached. An electricity pylon line passes to the south east of the site.

Looking north west from Trevia (see Map B), for those with sharp eyesight, most of the ten turbine towers would appear against the skyline, particularly against a bright sunset in the western sky. This would appear similar to the "romantic" public relations photographs of wind turbines taken with a telephoto lens.

An indication of the visual impact of the turbines at the nearest habitations can be gained by looking at diagram 2 and comparing the distances from the nearest dwellings to the wind turbines as shown on Map B and by holding diagram 2 half a metre from your eye to see the apparent size of the wind turbines at various distances.

It should be noted that Delabole is in an area of high rainfall and that the proposed wind farm site will at times be obscured by rain and mist.

**Noise**

Two forms of noise are emitted from wind turbines:

- aerodynamic noise from the blades cutting through the air - this is a swishing sound.
- mechanical noise from the moving machinery in the turbine i.e. from the gearbox.

Noise is measured in decibels dB(A). On this particular site at Delabole the background noise level is somewhat higher than many rural areas due to activities at the Delabole slate quarry, the low frequency hum from the high voltage transmission lines, the relatively busy B3314 and general agricultural machinery noises.

The impact of noise from the turbines can be compared with background levels in the area. Measurements of background noise were taken at two locations:

	<i>Noise level exceeded 50% of the time</i>
<i>Higher Trethern Farm</i>	45 dB(A)
<i>Rock Head Farm, Delabole</i>	38 dB(A)

Acceptable night time outside noise levels could be defined as 47 dB(A). Map B shows the predicted 45 dB(A) sound contour from the wind farm.

**Interference with TV transmissions, radiowaves and microwaves**

When wind turbines are located in the direct site line between transmitter and receiver, signals can be scattered, reflected and distorted. With television transmissions this can be a particular problem if the signal strength is weak in a particular area.

In the Delabole area the TV signal strength is strong and the site is not on any direct microwave transmission routes.

**Wildlife**

Extensive investigations world wide have shown that the only form of wildlife affected by wind energy is birdlife.

A study carried out by J. Winkleman at a wind farm in Holland in 1984 produced the following findings. Out of 87,000 bird movements recorded, 13% of migratory birds and 5% of local bird movements showed a change of flight behaviour attributable to the wind turbines and no dead birds were found. He concluded that the possibility of bird collisions with medium sized turbines in good visibility was nil, and that there was negligible effect on breeding and feeding habits.

The proposed site at Delabole is not on a migration route and there are no overhead lines included in the development.

**Safety**

Oil levels, vibration and temperatures in the gearbox and bearings are all monitored constantly by computer. Any failure will result in the computer shutting the turbine down automatically.

The most serious safety aspect of wind turbines is to avoid the possibility of rotor blade over-speeding causing the blades to break off. This is dealt with by the automatic pitch control mechanism which will stop the rotor blade aerodynamically within a few revolutions. This device is backed up by massive mechanical braking with both systems designed on the fail-safe principle.

The whole turbine has been designed to withstand winds of up to 134 mph.

**Polluting emissions**

Wind energy is a non-polluting and renewable source of energy. The proposed wind farm would save the equivalent of 2000 tonnes of oil per year. The annual savings in polluting emissions when compared with electricity from a coal fired power station are as follows:

<b>Pollutant</b>	<b>Tonnes per year</b>
<i>Sulphur dioxide</i>	47-75
<i>Nitrogen dioxide</i>	28-56
<i>Carbon dioxide</i>	7100 - 12000
<i>Particulates</i>	3.7-6.6
<i>Slag and ash</i>	377-661

The range of pollutant output is due to the varying efficiencies of the power stations and the quality of the coal.

**Archaeology**

There are no known features of archaeological or historical interest on the site.

**Decommissioning**

The ten wind turbines are designed for a 20 year life after which, they can be unbolted from their concrete foundations and removed. Ten concrete pads six metres in diameter will be left sunk into the ground.

**ATTITUDES TOWARDS WIND POWER**

An extract from a survey of opinion carried out in 1992 by Brian Young PhD for the Energy Technology Support Unit. The information given here is for a sample of people living near the Delabole Wind Farm in Cornwall. They were asked if the following statements were accurate or inaccurate or they were not sure.

**Wind farms spoil the scenery**

<b>Response</b>	<b>Percentage</b>
Accurate	28
Not sure	12
Inaccurate	60

The same question was asked in 1990, prior to the wind farm being built. At that time over 50% thought that it was an accurate statement that wind farms spoil the scenery.

**Wind turbines are a noise nuisance**

<b>Response</b>	<b>Percentage</b>
Accurate	10
Not sure	12
Inaccurate	78

**Wind power is clean and does not cause pollution**

<b>Response</b>	<b>Percentage</b>
Accurate	93
Not sure	4
Inaccurate	3

**Building wind farms provides local employment**

<b>Response</b>	<b>Percentage</b>
Accurate	29
Not sure	18
Inaccurate	53

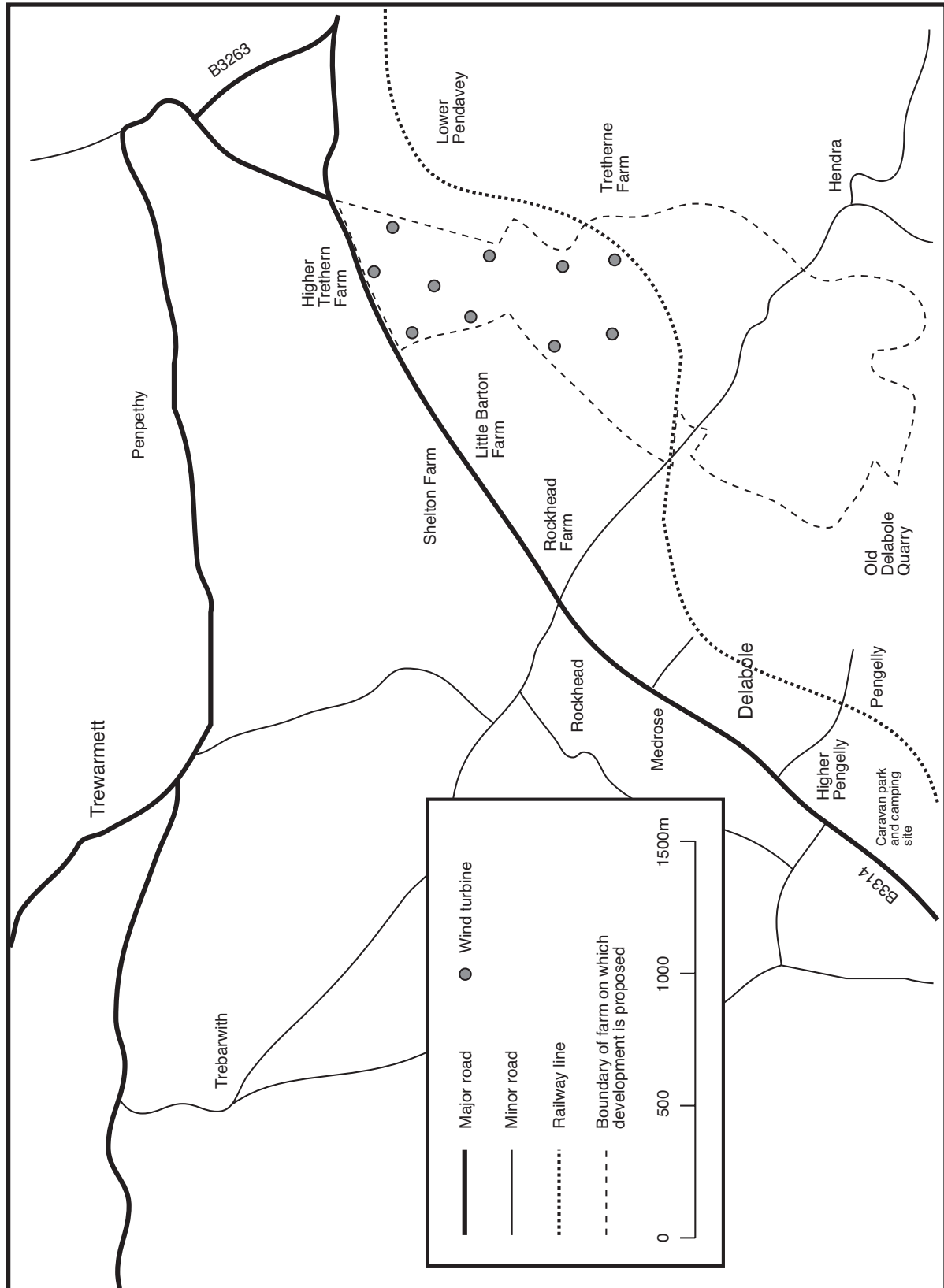
**A wind farm will be a tourist attraction**

<b>Response</b>	<b>Percentage</b>
Accurate	83
Not sure	7
Inaccurate	10

**Wind turbines will disturb wildlife in the area**

<b>Response</b>	<b>Percentage</b>
Accurate	6
Not sure	25
Inaccurate	69

MAP A - DELABOLE WIND FARM



MAP B - DELABOLE WIND FARM

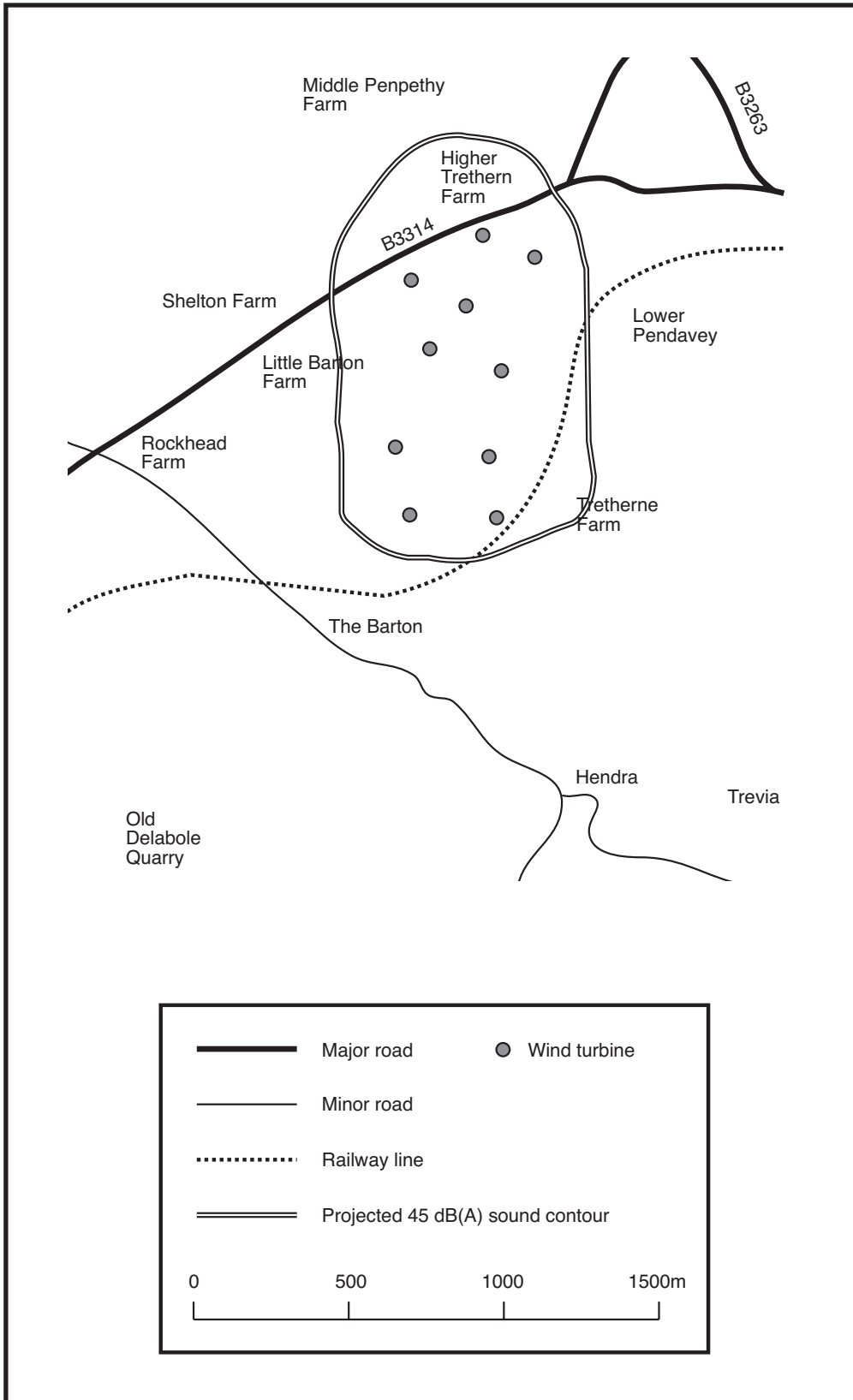


DIAGRAM 1 - COMPARISON OF TURBINE SIZE TO ELECTRICITY PYLON

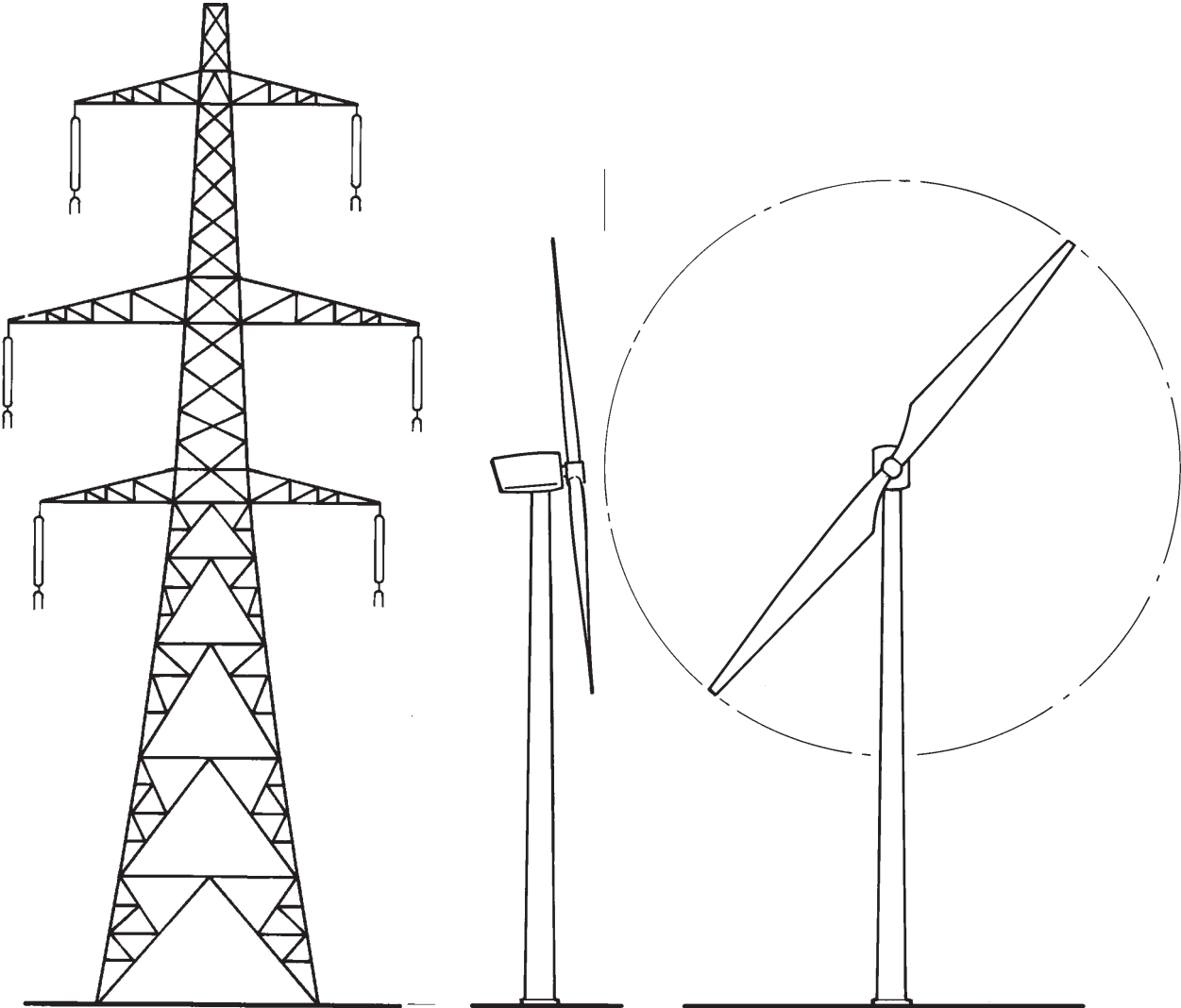
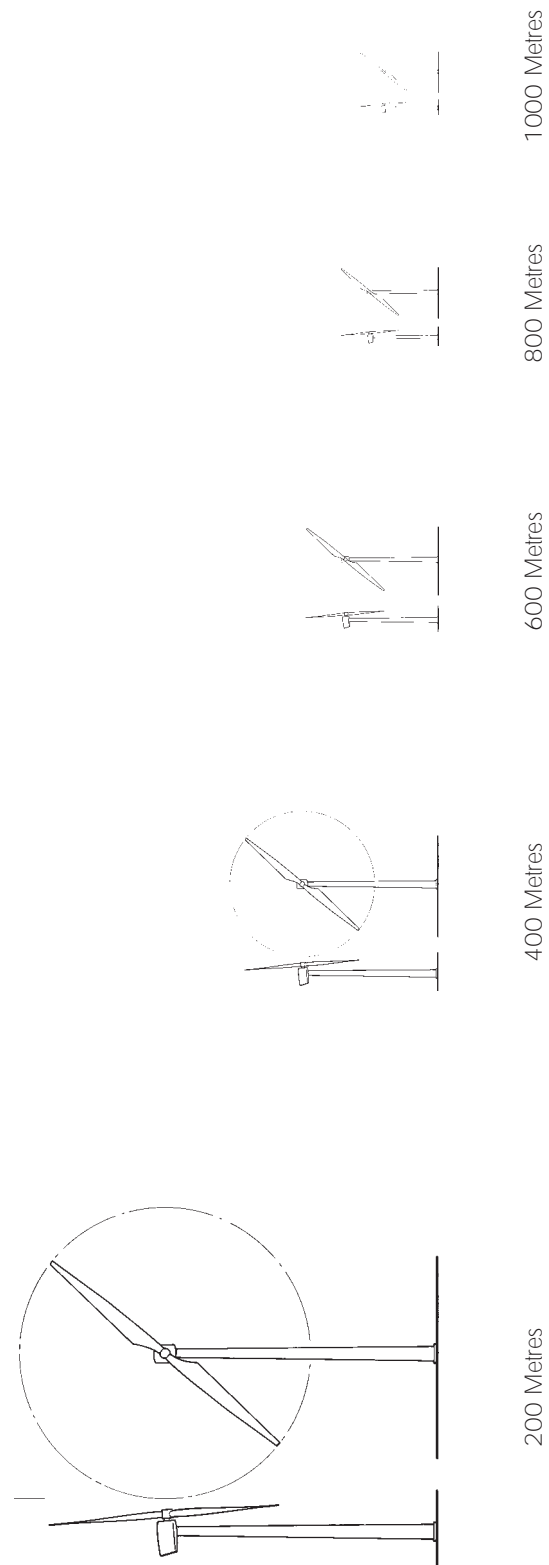


DIAGRAM 2 - THE APPARENT SIZE OF TURBINES FROM VARIOUS DISTANCES



# THE GREEN DREAM THAT TURNED TO A NIGHTMARE

by David Howell MP

Central Wales is a place of rounded hills, deep wooded valleys and ancient towns and villages. The air is pure and water runs fresh in every mountain stream. In short, it comes as near to an environmentalist's Utopia as anything you can find.

But something has come to disturb this paradise. Gaze up the valleys and you may well see the skyline broken by sinister, spiky structures stretching 100 ft high and sprouting in great numbers across the hillsides.

These are windfarms, petrified forests of metallic grey towers, topped by vast propellers, creaking and clanking to feed a dribble of electricity into the National Grid. Already there are several in operation in the hilly parts of the UK - and many more are planned here and elsewhere.

In theory, these windmills are the

perfect environmental answer to the energy crisis - clean, infinitely renewable power. Everyone should surely be in favour. But, in practice, the green dream has become a nightmare. It would be hard to imagine a more grotesque visual intrusion on the rural landscape than these armies of strange, space-age turrets.

One thing they are not, and that is harmonious features blending into the countryside. Those who live within a few miles also complain of maddening sound effects, day and night - a sort of double moan, part whine, part throb. So how has this come about?

The immediate explanation is simple. It pays very well to put these windmills up. And it pays landowners, usually hard-pressed farmers, to let the windfarm enterprises use their land. Promoters of these schemes can

expect to earn tens of thousands a year selling the electricity from a single whirling propeller.

Landowners are paid rent at around £2,000 a year per tower, which turns a big field with, say, 20 of these monsters into a very nice earner. The money is so good, and the queue of schemes getting so long, not because the cost of power from windmills is low but because the price paid for it by the electricity distributors is amazingly high.

The power companies must buy a percentage of their supplies from 'renewable' sources. To secure this, they are prepared to pay around four times the normal wholesale price - 11p a unit. They find the cash by charging consumers just that little bit more. So we all pay for the windfarms.

A green dream has turned into a rural pest. So all further projects to scatter these whirling pylons along our loveliest hills should be halted.

MAIL ON SUNDAY" 29.8.93

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## RAMBLERS JOIN OUTCRY AGAINST WINDFARM

### FALLOUT

by Martin Wainwright

One of the biggest countryside groups will throw its weight today behind the growing campaign against windfarms in remote upland areas.

The national conference of the Ramblers Association, which has 173,000 members, is expected to vote to reverse its policy of favouring the turbines as a pollution-free source of energy. Buffeted by gusts across the moors above Bradford, the association's executive set out their case yesterday in a pre-conference

hike along the Pennine Way.

It's getting to be known as the Wind Farm Way," said Alan Mattingly, the national director, against the susurrant of 23 windmills at the joint Yorkshire Water/Yorkshire Electricity farm on Ovenden Moor.

"We originally saw wind power as a benign and environmentally friendly resource, but that has not proved the case in practice. Our members are telling us very loudly that they do not like windfarms at all."

Association delegates will be told that turbines are proving visually intrusive at almost all the 30 sites approved by the Department of Trade and Industry under its promotion of non-fossil fuels.

"Noise has also proved much worse than expected," said Mr Mattingly, "and there are growing concerns about danger. Apart from the possibility of blades shearing off, you can see for yourself the warning notices here at Ovenden about ice being flung from the turbines."

The association will call for a comprehensive review of the effect of existing farms, with the Government's non-fossil fuel subsidies frozen pending the outcome. A further 230 projects are being considered in the third phase of windfarm development, although Tim Eggar, the Energy Minister has said that only about 20 are likely to win approval.

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## KIELDER WINDFARM MEANS JOBS

Supervising the site, a 6 month maintenance cycle for each turbine and generally looking after the equipment and 'powerlines', requires the attention of a dedicated team of some 15 full-time workers.

During the 12 to 18 month construction period, at any one time, there will be something like 80 to 100 jobs on the site, peaking at 200. Most of these will be construction jobs, but surveyors, electricians, engineers, fitters, plant operators and drivers will also be needed.

Construction work will go out to tender with local companies competing. Whoever gets the work will be encouraged to use local labour.

In all there will be more than £10m pumped into the local economy during construction.

## RAMBLERS, WIND ENERGY AND HOT AIR

**Now that the Ramblers Association is to withdraw its support from the wind energy programme, (Guardian, March 26) can we expect it to oppose other artificial intrusions on to the moors, such as dry stone walls, stone circles, and hill-farming?**

I walked across Ovenden Moor last week and found the view of the wind farm rather beautiful. Going nearer it was also completely silent and, in my opinion, a rather fitting thing to stand on a very bleak moor.

The Ramblers Association has swallowed the propaganda of middle-class Nimbys, who moved to the country to avoid such things as coal-fired power stations, who now feel threatened by the sight of these turbines, while continuing to use vast amounts of energy to power their cars, dishwashers, central heating and so on.

I am sure that many town dwelling walkers will continue to enjoy their own escape to the moors, whether or not they have to share the hills with windfarms.

**Duncan Couchman**  
20 Marsland Place  
Thornbury  
Bradford

## ENERGY POLICY

### **TASK**

Your task is to look at the visual impact of wind technology at a national level.

You should research the problem of visual impact of wind farms. You should present arguments for or against the development of wind farms in the following specially designated areas:

- National Parks
- Areas of Outstanding Natural Beauty (AONB) and Heritage Coasts (National Scenic Areas in Scotland)
- Areas of Great Landscape Value (AGLV)

You should take into account Government policy on the development of renewable energy and reduction in carbon dioxide emissions. You have been provided with:

- A map of designated areas
- Summaries of government policies and descriptions of designated landscapes.

GOVERNMENT POLICY BRIEFING SHEET

**Policy on renewable energy**

The government has a target of installing 1500 MW of new renewable electricity generating capacity by the year 2000. As much as half of this capacity could be onshore wind farms.

A typical sized wind farm with 18 medium sized wind turbines with a total declared net capacity of 2.5 MW (40% of the installed capacity) would generate about 20 million kWh per year. Each wind farm of this size would be spread over 2 square kilometres of land (most of this area could still be available for agricultural use). The government's policy implies that the equivalent of 300 wind farms of this size will be built by the year 2000. This will put a considerable pressure on all areas that are sufficiently windy for the commercial use of wind energy. Many of our most windy areas are the beauty spots of the British Isles.

**Policy on carbon dioxide emissions**

The government has a policy of returning carbon dioxide emissions to 1990 levels by the year 2000. The government estimates that this will require implementing programmes to achieve annual savings of 36.7 million tonnes of carbon dioxide.

The government's target for generating electricity from wind would result in savings of about 4.3 million tonnes of carbon dioxide if wind generated electricity displaced fossil-fuel and nuclear generated electricity in the same proportions as they existed in 1992.

**Extracts from Planning Policy Guidance Note 22: Renewable Energy**

(this is guidance from central government to local planning authorities)

On designated areas:

*The Government continues to recognise the fundamental importance of policies to protect the landscape and wildlife and certain areas designated in which stricter planning controls are applied.*

*Particular care should be taken, in assessing proposals for developing renewable projects, in National Parks and Areas of Outstanding Natural Beauty. Similar consideration arise in areas of archaeological importance and on the coast.*

On wind energy:

*The visual impact of wind turbine generators is influenced by the five principal factors:*

- *land form and characteristics*
- *number and size of machines*
- *design and colour*
- *layout of machines*
- *the existing skyline of the area*

*The countryside of England and Wales is of great variety, and variations in land form and characteristics may occur quite dramatically within comparatively small distances. In comparison with other well-established forms of development in the countryside, wind turbine generators are individually of low mass and require no extensive supporting infrastructure or services, but they do present a distinctive vertical feature and the characteristic of movement not normally present in man-made structures, apart from traditional working windmills.... In terms of visual impact, wind turbine generators must be assessed with their particular and unusual characteristics clearly in mind.*

### **Designated Areas**

There are a range of designations that can be given to areas marking their status as landscapes and their value for outdoor recreation (amenity). None of the designations would legally prevent the development of a wind farm but they should raise the question - Why here in this beautiful place?

National Parks and Areas of Outstanding Natural Beauty account for 20% of the land area of England and Wales.

### **National Parks**

There are ten National Parks. Snowdonia and the Lake District are two examples. They are defined as....

*"an extensive tract of land which by reason of its natural beauty and the opportunities it affords for open air recreation shall be preserved and enhanced for the purpose of promoting its enjoyment by the public."*

National Parks and Access to the Countryside Act 1949

### **Areas of Outstanding Natural Beauty (AONB) and Heritage Coasts**

In 1990 there were 38 designated AONBs. Parts of the north coast of Cornwall and Devon and the Malvern Hills are examples of AONBs. Examples of Heritage Coasts are the Lands End peninsular and the Pembrokeshire Coast. Both AONB and Heritage Coast status is recognition that an area is of national importance and that its amenity and landscape character should be protected.







In Scotland, nationally important landscapes are designated as National Scenic Areas.

### **Areas of Great Landscape Value**

These are areas of regionally important landscape value i.e. a lesser status than an AONB. An example in Cornwall is Tregonning Hill. Cornwall County Council has a policy of resisting developments that will adversely affect the amenity and landscape value of these areas.

## AREAS WITH PREDICTED HIGH WINDSPEED IN ENGLAND AND WALES

### Annual average windspeeds at 30m

-  Windspeed  $\geq 7.5$  m/sec
-  Windspeed  $\geq 8.0$  m/sec
-  Windspeed  $\geq 8.4$  m/sec
-  Windspeed  $\geq 9.0$  m/sec
-  Area within National Park
-  Area of outstanding natural beauty

