

THE CASE AGAINST WINDFARMS

Country Guardian has been researching the impact of windfarms on the environment since its formation in 1992. Its research document "The Case Against Windfarms" is detailed and runs to about 20 A4 pages. Most recently updated in May 2000 it is printed below, preceded by a statement of *Country Guardian's Policy on Windfarms*. You can use the Index on the left to go straight to a specific section, or read it straight through, or download it

- [A. THE CASE FOR WIND "FARMS" EXAMINED](#)
- [B. THE SCALE OF DEVELOPMENT REQUIRED](#)
- [C. THE PROBLEM OF INTERMITTENCY](#)
- [D. LANDSCAPE QUALITY OF WIND "FARM" SITES](#)
- [E. BEAUTIES OR BEASTS?](#)
- [F. WIND TURBINES OFFSHORE?](#)
- [G. THE NOISE FACTOR](#)
- [H. TELEVISION INTERFERENCE](#)
- [I. WIDER ENVIRONMENTAL CONSEQUENCES](#)
- [J. SAFETY](#)
- [K. TOURISM, JOBS, HOUSE PRICES](#)
- [L. THE EFFECT ON BIRDS](#)
- [M. PUBLIC OPINION](#)
- [N. WHY THE NEW PHENOMENON OF WINDFARMS?](#)
- [O. GOVERNMENT POLICY](#)
- [P. EUROPEAN UNION POLICY](#)
- [Q. KYOTO](#)
- [R. WIND 'FARMS' AND THE PLANNING SYSTEM](#)
- [S. THE FUTILITY OF SUPPLY-SIDE SOLUTIONS](#)
- [T. HOW CAN ELECTRICITY NEEDS BE MET?](#)
- [U. THE VALUE OF LANDSCAPE](#)
- [V. CONCLUSION](#)

Country Guardian's Policy on Windfarms

Country Guardian believes that the development of commercial wind power that has taken place with government support since 1990 is misguided, ineffective and neither environmentally nor socially benign.

We accept that wind energy has a role and that the countryside has always changed and will always change but we argue that the environmental and social cost of the development of commercial wind energy is quite out of proportion to any benefit in the form of reduced emissions. The industrialisation of our least developed landscapes, irreversible ecological damage, loss of amenity and the social division of communities is too high a price for an insignificant and unreliable contribution to our energy supply and a small and uncertain saving of pollution.

Wind power can be a very useful method of generation for households, farms, estates and small communities sited away from the grid. Turbines may be acceptable where they are not in conflict with the scale and character of the local environment but they must not blight the lives of those living nearby with noise and flicker or endanger residents or visitors either on foot or horse; they must not create economic disadvantage through reduced property values or damage the tourist industry or the local economy; and they must not divide communities.

A. THE CASE FOR WIND "FARMS" EXAMINED

No-one claims that wind turbines produce electricity more cheaply or more efficiently than conventional power stations. Being unpredictable and uncontrollable the wind is a difficult energy source to work with. Merchant ships are not powered by sail; airlines do not use hot air balloons. Those who advocate wind "farms" base their arguments on three propositions:

- 1) that they produce energy without the problems associated with nuclear power - risk of accident, problems of waste storage;
- 2) that they do not deplete fossil fuels, which are finite;
- 3) that they produce energy without harmful emissions - CO₂, SO₂ and Nitrogen Oxides, gases associated with global warming and acid rain.

For these arguments to be valid it is clear that wind "farms", if developed in sufficient numbers, must significantly reduce emissions, must close a nuclear power station or must measurably slow the depletion of other fuels which will soon be exhausted.

Wind Power vs. Nuclear Power

The nuclear question is straightforward, at least in relation to wind. John Redwood, when as Welsh Secretary he gave evidence to the Welsh Affairs Select Committee on Wind Energy, was asked specifically if the development of wind technology would close a nuclear power station. He confirmed that existing nuclear power stations would continue to the end of their working lives regardless of wind "farms". The present government has not changed this position. Indeed, wind power can never close a power station of any sort, because when the wind does not blow wind turbines produce no electricity and need a back up from a power station matching their capacity if there is not to be a power cut.

Far from reducing our dependence on nuclear, the percentage of electricity provided by nuclear power stations has grown during the last decade when wind turbines have been constructed in large numbers. In 1990 there were no wind "farms" and 20% of our electricity came from nuclear; in 1997 we had more than 700 turbines and 30% of our electricity came from nuclear. There is no possibility of wind and other renewables making up a 30% shortfall in our generation of electricity. A European Commission report published in April 2000 indicated that over the next 20 years at least 85 new nuclear power stations will have to be built in Europe, including four in the UK, if targets on emissions of CO₂ are to be met, since nuclear generation produces no emissions and current nuclear plant is ageing. The report advises that existing nuclear plant should operate for forty years, despite having an envisaged working life of only 25 - 30 years. When the current nuclear power stations close, they will be replaced either by gas stations (CCGTs) or by modern nuclear plants. That will be a thorny political debate, but it will be one in which the wind industry plays no part since, as the report concludes, renewables will not be able to meet the shortfall.

Since Chernobyl no one has been able to ignore nuclear risks and recent problems at Sellafield have underlined them. It is dishonest of the wind industry to use these risks to frighten people into accepting wind turbines in unsuitable locations, since turbines can form no part of the solution. It is important to remember the words of Ian Mays, when he was, as chairman of the British Wind Energy Association, giving evidence to the House of Commons Welsh Affairs Select Committee on Wind Energy: "The future can only be renewables and nuclear in some sort of combination" (30.03.1994). And let us not forget what Dr David Lindley of National Wind Power said in evidence to the House of Lords on 18th February 1988: "We all work for companies which are involved in some way in the construction of nuclear power stations, so we are hardly anti-nuclear."

Fossil Fuel Depletion

Fossil fuels are certainly finite resources. The question is whether they are in such short supply as to cause us concern. A Club of Rome report in 1972 predicted they would run out by 1990.

The Director General of the UK Petroleum Industry wrote to *The Times* in late 1999: "Current known reserves-to-production ratios range from about 50 years for oil and gas to over 200 years for coal." He suggested, too, that undiscovered fields of oil and gas, tar shales and oil sands will extend the availability, albeit with higher extraction costs. Reserves of coal will probably never be exhausted, because: "coal became obsolete, with huge and useless British and world reserves" (- Dr A McFarquar of Cambridge University to *The Times* in 1999). These stocks, however, along with uranium reserves, will assure continuity of electricity supply.

The authoritative House of Commons Trade and Industry Committee reported (*Energy Policy* -June 1998): "We see no grounds for major concern over the very diverse countries of origin of supplies of gas, nor the prospects of prices being driven unnaturally high by cartel ... There are no reasons either on grounds of security of supply or of confidence in long term availability to resist the growing use of gas."

Don Huberts who heads Shell Hydrogen, a division of Royal Dutch Shell is convinced that new energy sources will soon begin to replace fossil fuels. He wrote in *The Economist*: "The stone age did not end because the world ran out of stones and the oil age will not end because the world runs out of oil."

Apart from conventional gas reserves, hydrates (compressed methane) found in immense quantities on the ocean floor are alone sufficient to power the world for another millennium. The problem at the moment is how to recover them without releasing the gas once the pressure is off, but a Japanese company is currently planning to drill down to a known deposit 40 miles off Japan's Pacific coast.

The conclusion we must draw is that there is at least no rush to plaster our landscape with huge turbines. An unpredictable and intermittent energy source like wind can never supply more than about 10% of our electricity without causing major disruption to the system as it cuts in and out. If in fifty years it is clear that even this marginal quantity of electricity is vital, then at least wind turbines have the virtue that they can be erected very quickly.

CO2 Emissions and Global Warming

The burning of fossil fuels is a major source of CO2 emissions, which have risen dramatically over the last twenty five years and been linked by many scientists to global warming. Estimates vary about how much the world will warm over the next century, about what the effects will be and about the extent to which human activity rather than natural cyclical effects are the cause of climate change. According to *The New Scientist* there is broad agreement that the global average temperature will rise by 1.5 degrees by 2100. It is a welcome phenomenon that governments are beginning to look at the issue and to form policies that head off potential dangers.

There is a risk, however, that governments will avoid the more difficult political decisions. If we accept that global warming is a major threat to humankind, why did the UK government impose a moratorium on the move to relatively clean gas-fired power stations and recently offer a large cash subsidy to the coal industry? Why has it avoided measures to deal with traffic growth (emissions from cars are our fastest growing source of CO2 and air travel is becoming a serious contributor)? Why is insulation material subject to VAT at 17.5% while energy consumption (our gas and electricity bills) is subject to VAT at only 5%. And while nuclear power is highly unpopular and carries obvious risks, it generates 30% of our electricity and produces virtually no CO2 - so why do we hear so little discussion of what is to replace our current nuclear power stations as they reach the end of their working life within the next ten to twenty years?

A government fearful of taking the politically difficult decisions on energy may be tempted to hide behind some green window-dressing, and this in our view is what the encouragement of wind "farms" has been since the early 1990s. According to the government's consultation paper *New and Renewable Energy - prospects for the 21st Century* (March 1999) it is "working towards a target of renewable energy providing 10% of UK electricity supplies ... by 2010." This "could lead to a reduction of 5 million tonnes in UK carbon emissions." Since UK Carbon emissions are projected to total 168 million

tonnes of carbon by then, the renewables programme could lead to a reduction of just under 3%. Not all the renewable energy is to come from wind. Other sources are hydro, energy crops, waste incineration and other biomass. The projection is that wind will contribute between 2.1% and 4.4% of UK electricity supplies, according to the constraints put on the development of wind "farms". Thus, using the government's figures, wind farms could lead to a reduction of between 1.05 and 2.2 million tonnes of carbon per year - between 0.6% and 1.3% of UK emissions - between 0.004% and 0.009% of global CO₂ emissions. Clearly that will have no effect whatsoever on global warming or climate change.

Wind Turbines and Carbon Dioxide - a case study.

A large turbine in Gloucestershire saves less than the amount of CO₂ produced by just one articulated lorry.

At Nympsfield in Gloucestershire a single 500 kW gearless Enercon turbine was commissioned in Dec. 1996. Its annual output is about 1.11 million kWh (*Tilting at Windmills* BBC 2, 2.2.99). Since the turbine generates not only during the day, when it might displace oil- or coal-fired generation, but also at night when mainly nuclear and gas generation are operating, it is logical to assume that it displaces a mix of fuels, rather than only coal or oil. Department of Trade and Industry figures indicate that the 1995 generating fuel mix produced an average of 620g. of CO₂ per unit of electricity generated. Thus we can calculate that the Nympsfield turbine saved about 688 tonnes each year, or 0.078 tonnes per hour.

An articulated lorry travelling at 50 mph along a motorway produces 0.08 tonnes of CO₂ per hour. Given the uncontrolled growth of road traffic, the erecting of turbines is a futile exercise. How many turbines would we have to build each year to merely to keep pace with traffic growth?

Return to [Home Page](#). Return to start of [Case Against Windfarms](#)

B. THE SCALE OF DEVELOPMENT REQUIRED

The wind industry argues that 10% of our electricity could be generated by wind turbines. Even if only a smaller proportion is produced by wind - say 4.4% as envisaged by the government paper *New and Renewable Energy* - there are those who would regard the contribution to the fight against air pollution (however infinitesimal in global terms) as worthwhile. Country Guardian argues that the environmental costs of developing wind energy on this scale hugely outweigh the derisory savings in emissions. The core of the problem is tiny output of even the biggest wind "turbine", the prominence of the sites necessary if they are to fulfil even their very limited generating potential and the huge numbers required in consequence to generate even modest amounts of electricity.

The machine is more accurately called an airscrew generator. Real turbines - water, steam or gas - have three characteristics in common: They are encased, the casing being vital to their operation; they operate at very high numbers of revolutions per minute; and they produce enormous amounts of electricity in relation to their size. The wind "turbine" is set to produce power at low to moderate wind speeds, when the output is a trickle. As the wind strengthens and real power becomes available, they have to be shut down or they will blow over.

Official figures for wind turbine output in the UK in 1998 confirm that their average output is about 25% of their theoretical capacity. A 200 ft high wind turbine of 500 kW capacity will on average produce 125 kW - enough to boil 50 electric kettles. The biggest turbines currently operating have a theoretical capacity of 1.5 MW, which is likely to give them an average output of under 400 kW

The two biggest wind "farms" in Europe are close to each other in Powys, at Llandinam and Carno. Between them, they have 159 turbines and cover thousands of acres.

Together they take a year to produce less than four days' output from a single 2000 MW

conventional power station. Together, they have an output averaging 20 MW (in winter, UK demand peaks at about 53,000 MW).

The number of turbines needed to produce a given amount of power depends on the size of the turbine and the wind speed of its site, so estimates vary.

UK annual electricity consumption is about 300,000 million units (300 TWh). 10% of consumption is 30 TWh and 4.4% is 13.2 TWh.

In 1997, 550 wind turbines in Britain produced 505 million units. Extrapolating from that, we would need 14,400 turbines to produce 4.4% of our electricity and 32,700 to produce 10%. Allowing that the turbines now being produced have significantly higher outputs, the required units might be produced by 10,000 or 22,700 machines.

Wind Power Monthly reported in January 2000 that the installed capacity of turbines on a world-wide basis at the end of 1999 was 12,455 MW. That represents the theoretical maximum output of nearly 40,000 turbines, erected over 30 years! If we remember that the average output of a wind turbine is only 25% of its capacity, all the world's wind machines are on average producing 3,100 MW or 27 TWh per year: just 9% of the consumption of one very small country like the UK and less than the output of a single British power station like Drax. When it is remembered that this derisory achievement was only possible with governments around the world encouraging the construction of turbines with subsidies or tax credits, it can clearly be seen that at best wind energy is an irrelevant side-show, while at worst it may deceive consumers into believing that something worthwhile is being done to combat emissions.

Return to [Home Page](#). Return to start of [Case Against Windfarms](#)

C. THE PROBLEM OF INTERMITTENCY

Wind is an intermittent source of power and the only form of energy generation which we cannot control. If there is no wind, there is no generation; if there is too much wind the turbines must be shut down or they will be blown over. At the moment UK turbines generate only an insignificant trickle - less than 100 MW on average from nearly 50 wind "farms", towards an average demand of about 43,000 MW, so that their intermittent supply causes no problems for consumers - indeed those who manage supply simply ignore their existence.

If ever the wind industry gets its way, however, and builds the 22,700 turbines necessary to produce 10% of our supply, there would be major implications. For example, on January 7th 1997 demand in the UK peaked at 53,000 MW. The British Isles were covered by an area of high pressure and there was no wind. Had we been relying on wind to provide 5,300 MW at that point, there would have been widespread power cuts and 10% of the population would have been without electricity on a cold winter evening. Of course, that kind of disaster would never be permitted in a modern industrial state, and so enough fossil fuel generating capacity would always be kept on stand-by ("spinning reserve") to supply the shortfall if the wind dropped: any emissions savings will thus be reduced and of course no power station could ever close because of the major development of wind energy. Wind "farms" constitute an increase in energy supply, not a replacement - an extra environmental cost to add to that of nuclear and fossil fuel.

Return to [Home Page](#). Return to start of [Case Against Windfarms](#)

D. LANDSCAPE QUALITY OF WIND "FARM" SITES

Guy Roots, counsel for the wind farm developers at the Public Enquiry into the Kirkby Moor wind "farm" in the Furness Peninsula of the South Lake District, said: "It tends to be the higher parts of the country which are technically suitable for wind farms. These are too often prominent, scenically beautiful sites, and that causes a dilemma."

The map of Designated Areas - National Parks, Areas of Outstanding Natural Beauty, Sites of Special Scientific Interest etc. - overlaps almost exactly the map of high wind speed sites. Although the authoritative report by the Welsh Affairs Select Committee on

Wind Energy advised that wind "farms" should be sited neither within Designated Areas nor where they would be clearly visible from such areas there is in practice no restraint over where developers may seek to erect wind turbines. They tend to target areas with the highest wind speed because these will guarantee the greatest output and the highest return. In addition, the system of subsidy which operated throughout the 1990s, the Non-Fossil Fuel Obligation (NFFO), invited competitive tenders from developers on the basis of cost per unit of electricity generated, with no reference to environmental acceptability, so that the system itself tended to produce applications in sites which were environmentally damaging.

The result is that wind developments have threatened much of our very finest landscape: at Corston and Cilciffeth, both on the borders of the Pembrokeshire National Park; on the Black Hill, Herefordshire (SSSI, Area of Great Landscape Value, 200 metres from Brecon Beacons National Park); the Denbigh Moors (SSSI, less than 2 miles from Snowdonia National Park); Ingham Farms, less than 1 mile from the Norfolk Broads National Park, and many others. If these landscapes, which are some of the finest in Europe, are threatened, how much more so are undesignated landscapes like the notably beautiful Radnorshire hills, whose lack of designation is a puzzling anomaly, or those isolated hills in otherwise degraded landscapes which are treasured for their amenity value by those who live near them.

That no area can be considered so beautiful as to be sacrosanct is proved by a current proposal to build 50 turbines near the village of Rookhope in the Wear Valley, entirely within the North Pennines Area of Outstanding Natural Beauty. The turbines are each 300 feet high, almost as tall as St Paul's Cathedral, and will be visible from twenty miles' distance. The proposal conflicts with the Local Plan, the Structure Plan and even the government's guidelines for wind development, but the developers, National Wind Power, appear determined to proceed despite massive opposition. Incredibly, even the parent company, National Power, rejected the site seven years ago on the grounds that the AONB status of the landscape made it too sensitive for wind turbines, while the important peat soil structure would be profoundly damaged by construction work. If between ten thousand and twenty-two thousand of these huge machines are to be built in such locations as those which have been proposed to date there will be hardly any part of our most valued landscape which is not blighted. Apart from the turbines themselves, many miles of transmission lines and hundreds of pylons would have to be constructed because the sites are remote from the grid.

It is no wonder that in 1996 the Countryside Commission, which was then the government's landscape watchdog, warned that England's scenic countryside is in danger of becoming a "windfarm wilderness." It noted that nearly 150 turbines were being sited in or adjacent to Areas of Outstanding Natural Beauty and that a further nine wind "farms" were targeted on Heritage Coasts, Areas of Great landscape Value and the immediate vicinity of National Parks. The Commission's brief was only to deal with England. The UK picture as a whole is even bleaker.

Recently, the wind industry has responded to concerns such as these by proposing that half the turbines proposed for the UK could be sited offshore. This question is dealt with in section F.

Return to [Home Page](#). Return to start of [Case Against Windfarms](#)

E. BEAUTIES OR BEASTS?

Aesthetic judgements are subjective and there may be as many who find a wind turbine beautiful as there are who find it ugly. That is not the issue: a wind "farm" is an industrial site of vast proportions and a turbine is a huge and noisy machine - 300 feet high or even more, the height of a 30 storey office block. A 30 storey building by a leading architect might be very beautiful, but on planning grounds would be unacceptable in a small village or on top of the fells in the Lake District.

Supporters of the technology as committed as Friends of the Earth argue that they should be excluded from Designated Areas like national Parks, Areas of Outstanding

Natural Beauty and Sites Of Special Scientific Interest. Jonathan Porritt, another supporter, wrote in *The Daily Telegraph*: "The modern wind turbine is a mighty intrusive beast. It's not into nestling, blending in or any of those clichés so beloved of rural romantics."

Wind Power Monthly, the magazine for the wind industry and wind enthusiasts, has recognised that the reason for the growing unpopularity of wind power is that a heavy industry has tricked its way into unspoiled countryside in "green" disguise. The editor wrote (September 1998): "Too often the public has felt duped into envisioning fairy tale wind "parks" in the countryside. The reality has been an abrupt awakening. Wind power stations are no parks." She went on to point out that in Denmark turbines are treated within the planning process in the same way as motorways, industrial buildings, railways and pig farms!

Return to [Home Page](#). Return to start of [Case Against Windfarms](#)

F. WIND TURBINES OFFSHORE?

In its scenarios for renewable energy by the year 2010 in *New and Renewable Energy - Prospects for the 21st Century* the Department of Trade and Industry suggests that between 60 and 70% of wind-generated electricity could come from turbines sited offshore. Much larger turbines are envisaged at sea than on land - Enercon are developing a turbine with an installed capacity of 5 MW, 190 metres high - and they are likely to have a greater capacity factor because of more dependable wind speeds. We speculate that to meet the offshore wind target envisaged in *New and Renewable Energy* will require between 3,800 and 4,500 turbines.

From the latest information available (see Section O - Government Policy) it is not clear where the finance for this ambitious target in a pioneering field might come from. Nor is there an agreed map of areas for wind development offshore - this must certainly be a requirement to get through the maze of planning issues before work in the Crown Agents' seas can start.

The whole sea is not available for wind turbine development. Water depth has to be less than 40 m and the sea bed nearly flat. Shipping lanes, military zones, pipelines, helicopter flight paths between gas and oil rigs and the coast, and fishing grounds are expected to be no-go areas. Uneconomically long distances to grid connections and the absence of local port facilities would also be constraints.

The Countryside Agency has recommended the DTI to ensure that our coastline is not damaged by the scale, location or cumulative impact of turbines, and that special care should be taken with the visual impact of the lighting of wind stations at sea since they will have to be illuminated at night. It would like to see mandatory controls of distance from shore: 3 - 5 km off industrial coasts; 10 - 20 km off National Parks, AONBs or Heritage coasts; out-of-bounds in largely undeveloped estuaries.

Unfortunately, developers are likely to be interested in sites within 5 km of coasts, where the water is shallowest, the wind speeds the most favourable and the cable connections the shortest. The Energy Technology Support Unit (a DTI agency) has estimated that nearly half of off-shore turbines will be within 10 km (6.25 miles) of the coast, with fewer than 18% beyond the 20 km line. Three British off-shore projects are in preparation: Blyth Harbour, north of Newcastle, 1 km offshore; Scroby Sands, 3 km off Great Yarmouth; Gunfleet Sands, 5 km off Clacton-on-Sea. The Crown Estate has granted permits for wind measuring masts in the Solway Firth, off Rhyl in N Wales, off Swansea, in the Thames Estuary at Kentish Flats and at Ingoldmells Point north of Skegness. How acceptable from an environmental point of view wind turbines at sea turn out to be will depend on how close to the coast they are sited, how scrupulously the developers avoid coasts of special beauty and how carefully cable landing sites and pylons to carry cable to grid connections are sited. Some people will be glad if pressure on our uplands is reduced, but others will be dismayed by the industrial intrusion into the majesty of the seascape. Electricity from turbines at sea will certainly be more expensive and not much less unpredictable than that from land-based machines.

Return to [Home Page](#). Return to start of [Case Against Windfarms](#)

G. THE NOISE FACTOR

The noise from a wind turbine comes from both the mechanical gearing and from the aerodynamic properties of the rotating blades. The former can to a degree be controlled and insulated and some makes of turbine are quieter than others. The more intrusive noise comes from the effects of the blade moving through the air and the industry has had virtually no success in controlling this. Indeed, it has probably not tried seriously to do so. The web site of the VESTAS turbine manufacturer is revealing: "The new design allows the blades to cut so aggressively through the wind that the kilowatt counter runs as much as 17 - 19% faster than even its highly competitive predecessor. *Development work on this turbine has focused on one factor: profitability.*" [Country Guardian's italics - and it should be noted that these are the latest machines, a fact which undermines the industry's claim that only the early machines created significant noise levels. These turbines were erected at Ireleth in Cumbria and in 1999 *The Westmorland Gazette* reported: "Barrow's chief environmental health officer said the council was taking action against the noise nuisance."]

The larger the turbine, the greater the air mass moving the blades and the higher the noise level. The noise is a penetrating, low-frequency 'thump' each time a blade passes the turbine tower - reminiscent of the reverberating bass notes of a discotheque at a neighbour's noisy party, which can be heard and felt even when the rest of the music cannot be distinguished, or of a helicopter in the distance. That noise from wind turbines is one of the major environmental costs of the technology is suggested by the fact that 10% of PPG 22 (the government's Planning Policy Guidance note dealing with renewable energy) is devoted to the issue and by the fact that the Department of Trade and Industry spends more of its budget researching noise from wind turbines than on all other environmental noise problems. The Welsh Affairs Select Committee recognised the magnitude of the problem in its report on wind energy. "For existing windfarms we are satisfied that there are cases of individuals being subject to near-continuous noise during the operation of the turbines, at levels which do not constitute a statutory nuisance or exceed planning conditions, but which are clearly disturbing and unpleasant and may have some psychological effects."

The genuine difficulty that developers face is that noise levels cannot be predicted in advance. The Energy Technology Support Unit has reported (*Assessment and Prediction of Wind Turbine Noise -1993*): "At present there is no established method for the prediction of wind turbine noise and basic understanding of wind turbine noise is low. Not enough is known of the basic mechanisms which control the noise radiation process to allow the development of detailed prediction methods."

Despite the weight of evidence the wind industry has a history of dismissing the noise problem, particularly when it is "consulting" the population of an area targeted for a wind development or presenting information in support of an application or fighting an appeal. Windcluster, the developing company for the wind turbines sited in South Cumbria between the villages of Askam, Marton and Ireleth wrote a letter to householders about their plans in advance of the application. It reads in part: "The design and control systems will ensure that there will be no noise nuisance." (March 1995). By 1999, the local paper *The Westmorland Gazette* was reporting about this windfarm: "Environmental Health officers agree turbines contravene noise nuisance laws."

The developers at the Llandinam wind "farm", constructed in 1992, have been unable to solve the noise problem and complaints continue. At least one householder has succeeded in having his Council Tax reduced on the basis that the noise from the turbines has sufficiently reduced the value of his property for it to be

placed in a lower band. The chairman of the firm which built the wind "farm", Tim Kirby of Ecogen, was quoted in *The Guardian* (11.03.94) as saying: "Our acoustic consultants got it wrong. Their calculations didn't apply to this sort of terrain." His firm had previously issued a statement which read: "It is important that we at Ecogen apologise formally for giving the local people the impression that the windfarm will be [sic] inaudible. The blunt truth is that we were wrong and we recognise now that no operating windfarm can be considered to be inaudible." (22.02.93).

Those living close to wind "farms" find the noise levels completely unacceptable and are enraged that assurances about noise given in advance turn out to be worthless. One unhappy neighbour wrote about his experiences to *The Daily Telegraph* (21.10.93). "The impact of wind farms on landscape may be significant, but noise is more relevant to those of us living next to this new industry. My home nestles on the north-western slope of Mynach Bach, Ceredigion, below the 20 turbine windfarm owned by National Windpower. We live 350 metres from the nearest turbine and about 750 metres from six or seven others. The "thwump" of the blades and the grinding gears is driving us to distraction. My kitchen chimney amplifies these noises sickeningly. Since commissioning in July the house has frequently vibrated with sickening soundwaves. At night, these disrupt sleep even when all the windows are closed ... For my family and those in a similar plight ... there is a distressing human cost for this supposedly 'environmentally friendly' electricity. For us, this is no brave, new, clean energy but a rapacious industrial giant." (letter from C. Kerkham)

The residents of Marton, Ireleth and Askam formed their own action group after the construction of turbines near their villages, to seek redress. It is worth visiting their web site for a first hand account of the horrors of living near a wind "farm." On the subject of noise they write: "Standing 1000 metres downwind of the turbines is enough for most people to realise that they would not like to live within this distance of a turbine. The sound is invasive enough to penetrate the walls and double glazing of a house of modern construction and still be clearly audible inside. In our area there are houses that are a lot closer than this to the turbines, a few hundred metres in some cases. For these properties the wind direction is immaterial and the noise is constant and during summer nights it was not possible for the occupants to sleep with the window open due to the noise... Those of us who are unfortunate enough to be closest to the turbines are experiencing a barrage of background noise pollution that is actually making some of those worst affected physically ill."

Noise is recognised as a significant cause of stress and stress-related illness in modern society. It is worth recalling that the Americans considered using low-frequency noise as a battlefield weapon in the 1950s! Certainly, health problems have been reported by those living near wind "farms" at Llandinam, Llangwryfon and Ireleth.

While the visibility of wind turbines may reduce the value of a property, their noise will render it unsaleable.

Return to [Home Page](#). Return to start of [Case Against Windfarms](#)

H. TELEVISION INTERFERENCE

That wind turbines can disrupt TV reception was noted in 1994 when the BBC and the Independent Television Commission recommended the Department of the Environment to compel wind farm developers to restore reception where wind "farms" caused interference. In the same year *The New Scientist* accused the government of ignoring the recommendation and leaving viewers at the mercy of developers.

The Cambrian News reported (23.1.97) that the residents of the Rheidol Valley in Mid Wales experienced such bad TV interference that their televisions were impossible to view from the moment the turbines of the Cwm Rheidol wind "farm" were built.

Effectively turbines cause a reception shadow of up to 10 km when they stand between a TV transmitter and dwellings with TV aerials., pointing through the wind

turbines towards the transmitter. Viewers in such locations will have their signal scattered, causing loss of detail, loss of colour or buzz on sound.

In addition, viewers situated to the side of turbines may experience periodic reflections from the blades, giving rise to "ghosting" and flicker as the blades rotate. Significant interference is unlikely more than 10 km "downstream" of the turbines or beyond 500 m elsewhere around the wind "farm". It should be noted, however, that a *New Scientist* report in 1994 said that there were 50 main TV transmitters serving a series of relay stations which cover the country. A wind turbine disrupting signals in any location could cause interference all down the chain.

Developers can sort out most of the problems if they are prepared to spend enough money. Millhouse Green wind "farm" on Royd Moor in the Barnsley area, started to cause TV reception problems as soon as its first turbines were erected in 1994. For more than two years locals suffered first a total loss of reception and then poor reception as adjustments to aerials and retuning took place. Finally, a new relay station was built. Fortunately for locals, a council member had raised the risk of TV interference at the point when the developers, Yorkshire Water, were seeking planning permission. At first they denied that there would be a problem, but a clause was written into the planning agreement whereby they had to finance remedial work if it proved necessary.

Such an agreement is vital since possible solutions have problems and drawbacks involved: a new relay station will only help if there are enough frequencies available (digital carriers and Channel 5 have taken up many); retuning to another transmitter may mean loss of local news and programmes. Victims of this problem have found that the cheapest, rather than the most effective, options are tried first and that time and energy are needed to achieve a solution.

Turbines also disrupt microwave communications links and for this reason the Swedish armed forces blocked 15 wind "farms" in Norrtälje and have argued against wind developments on the coast between Stockholm and Uppland.

Return to [Home Page](#). Return to start of [Case Against Windfarms](#)

I. WIDER ENVIRONMENTAL CONSEQUENCES

Wind "farms" are such a recent phenomenon that it is hard to be certain of their long-term ecological impact. However, the Flaith Hill Opposition Group at Hebden Bridge, Yorkshire, commissioned an hydrologist and a number of engineers to examine the neighbouring Ovenden Moor wind "farm". They found that the erection of turbines 200 feet high had cracked the bedrock of this upland moorland and diverted natural watercourses. Around the turbines and along the cable trenches the thin layers of peat were drying out rapidly and it is likely that these sections of peat bog will simply blow away. Moreover, tracks to and between turbines have acted as dams and formed deep pools of peat "soup" - fetid surface water which cannot run or drain away. There is certain to be a knock-on effect on flora, insects and birds which depended on the ecological status quo before the turbines were built.

The hole excavated for a turbine's foundation has a volume equivalent to a 25m swimming bath. The extracted material has to be put somewhere else. The hole is filled with sand, aggregate and cement which has to come from somewhere else and has to be transported by heavy lorries. Several miles of service roads and cable trenches need to be constructed at a large wind "farm" site. If the site is at any distance from the grid, there will be pylons and overhead transmission lines to form the necessary connection. Wind enthusiasts admit that they need huge quantities of concrete for foundations and roads and are on record as claiming that many jobs are created or safe-guarded thereby. Yet the concrete industry is the biggest man-made source of CO₂ on the planet - about 7% of the world's total. Wind turbines produce significant amounts of CO₂ - they merely do it in advance. If the emissions created during manufacture and erection are averaged over the units of electricity generated during the lifetime of a turbine, the CO₂ cost is 50g per unit (*Algemeen Dagblad* - Netherlands - 8.2.2000). What was once inaccessible upland becomes accessible

for more intensive agriculture. Applications for further development can use the argument that the landscape is already degraded by wind turbines: this has happened in an application for a landfill site at Llanidloes in Powys, where the Llandinam turbines have been cited in the landscape assessment.

Dr John Hedger at the Institute of Biological Sciences at the University of Wales, Aberystwyth, has written: "Wind energy is not as clean as its proponents would have us believe. It is an industrial development and as such causes degradation of the environments where turbines are sited. The result is a loss of habitat for wildlife. The proposed environmental benefits of windfarming...will only come from the very large-scale use of turbines. One environmental problem will simply be replaced by another."

Paul Gipe, the California-based wind enthusiast, has recently taken the American wind industry to task for ignoring the serious problem of soil erosion found at wind "farm" sites.

Return to [Home Page](#). Return to start of [Case Against Windfarms](#)

J. SAFETY

Blades weigh up to 1.5 tonnes and their tips are travelling at more than 180 mph. When they have broken off they have planed up to 400 metres. On 9 Dec. 1993 parts of a blade were thrown 400 m at Cemmaes in Wales. At Tarifa, Spain, blades broke off on two occasions in Nov. 1995 - the first in gusty, high winds, the second in only light wind (report, *Windpower Monthly*, Dec. 1995).

In an article written in January 1996 Professor Otfried Wolfrum, professor of applied geodesy at Darmstadt University, wrote of a significant number of blade failures in Germany, detailing four particularly severe ones where fragments of blade weighing up to half a tonne were thrown up to 280 m. "From the experience in Germany, where presently of all European countries the greatest number of turbines is installed, it appears that this technology is by no means safe...particularly with the large new models, with rated capacities of 500 kW and more, problems arise since the rotor blades are heavier and have to be manufactured manually."

The civic authorities in Palm Springs, USA, as early as the late 1980s made developers move turbines to a distance of half a mile from the highway for safety reasons.

Apart from the danger of blades becoming detached or disintegrating, there is a risk that lumps of ice can form on them in still cold weather and then be thrown significant distances when the wind gets up and the blades begin to move. This danger is specifically recognised in the government's planning guidance document PPG 22. "In those areas where icing of blades does occur, fragments of ice might be released from the blades when the machine is started." Professor Wolfrum wrote on this subject: "Some ice layers 150mm thick have been detected and their mass has been as high as 20 - 23 kg/m (proceedings BORKAS 11Helsinki 1994, p219)" He demonstrated that these fragments could travel up to 550 m and land with impact speeds of 170 mph. It is hardly surprising that during the winter, the management company erects "Falling Ice" warning notices at the Ovenden Moor wind "farm" in Yorkshire.

In April 2000, three UK wind "farms" were closed for safety reasons, apparently because of metal fatigue in the turbine towers. The sites in question are at Cold Northcott in Cornwall and Cemmaes and Llangwryfon in Wales.

The Countryside Agency has called for turbines to be sited away from bridleways - a distance of three times the height of the turbines normally and four times the height of the turbines near National Trails (height to blade tip) - because noise and flicker can startle horses and endanger their riders and because of risk from thrown ice.

The British Horse Society has expressed similar concerns.

Return to [Home Page](#). Return to start of [Case Against Windfarms](#)

K. TOURISM, JOBS, HOUSE PRICES

The main adverse impact that wind "farm" development is likely to have on the economy of an area relates to tourism. We have already shown that in the UK the best wind speed sites are in the areas with the finest landscapes. Wind developers are therefore targeting those areas where the tourist trade consists of those seeking peace, quiet and unspoiled countryside. A National Tourist Board survey shows that 90% of British holiday makers who go to the countryside do so to enjoy it for its own sake and seek no further attractions like theme parks.

A survey by the University of Leiden in Holland in the late 1980s found that the majority of those questioned felt that a landscape lost its interest as turbines accumulated in it.

Although the first wind "farms" in Cornwall attracted tourist visits from those already in the area for other purposes, the attraction was one of novelty and visitor numbers have dropped with each succeeding year. Clearly, if developers succeed in erecting thousands of turbines, novelty value will be lost and those seeking rural peace will head for areas not degraded by turbines - for example National parks, where visitor numbers already cause a problem. There is anecdotal evidence (letters to the press from locals) that visitor numbers have fallen by 40% in areas of Denmark developed for wind energy. The North Devon Tourist Development Manager opposed two local wind "farm" projects fearing the effects "on existing tourism operators." The Welsh Tourist Board's policy on wind turbines reads: "The Board endorses the policies of the Countryside Council for Wales which oppose the introduction of commercial wind turbines and wind turbine power stations in primary designated areas (i.e. National Parks, AONBs, Heritage Coasts and Marine, National and International Nature Reserves). We consider that elsewhere proposals should be considered on their merits, the effects upon tourism being a material issue for consideration." Dumfries and Galloway Regional Council rejected a wind "farm" at Carlesgill partly because of its likely effect on tourism (rejection later overturned on appeal).

If wind "farms" threaten to destroy jobs in the tourist industry, they create few if any compensating jobs elsewhere. A typical wind "farm" would employ a single maintenance operative. The largest wind "farm" in Europe has three full-time employees. At the Bryn Titli wind "farm" in Wales even the construction site workers were Danish - erecting Danish turbines. Every turbine to be used in the projects currently on the drawing board is of foreign manufacture. Dazzling creative accounting is used by the wind industry to arrive at employment figures "relating to" wind, but the simple truth is that if the subsidies going into renewables were diverted to energy conservation, thousands of jobs would be created at a stroke, and far more emissions would be saved. Connah's Quay gas-fired power station created or secured 8,000 jobs, and all of the 500 contractors and consultants were based in the UK.

The only benefit to an area is the site rent (£1,000 - £2000 per annum per turbine) paid to a handful of landowners. The benefit could easily be outweighed by a decline in tourist numbers. It should be noted that with holiday cottages and caravan sites, tourism has become an important element of farm diversification. What one farmer gains another may lose. This is one of the reasons that communities have found themselves torn apart by the wind issue.

In terms of the impact on house values there can be no doubt. A partner in Durrants, the Mayfair and East Anglia chartered surveying firm, wrote (May 1998): "I can confirm that the outlook from a property does have a major bearing on its value and if this outlook is tarnished by a wind turbine or any similar structure, the values would be significantly decreased." International property consultants FPD Savills wrote in May 1998: "Any structure that can be viewed as an intrusion into the countryside such as electricity pylons or wind turbines will have a detrimental effect [on property values]. Usually, it will not only effect the value but also saleability which is not necessarily the same thing. Generally speaking, the higher the value of the property

the greater the blight will be ... As you go up the value scale, buyers generally become more discerning and the value of a farmhouse may be affected by as much as 30% if it is in close proximity to the wind turbine. Those houses that are within earshot are likely to be affected worst of all."

A chartered surveyor from Cumbria, Mr R.D. Wolstenholme, has written to *Open View* of his experience: "I am a chartered surveyor and recently sold my house at Lambrigg. I found that the proposed windfarm there (with all the implications for the additional ones adjoining) had a devastating effect on the value of my property. Three local agents all valued it at about £295,000 and during the first few weeks on the market we had three offers at around £280,000. Each accepted offer fell through as soon as it became apparent that the proposals at Lambrigg, Firbank and Whinfell would all overlook the property. After being on the market for six months, and no less than nine failed sales, we eventually succeeded in selling to someone who wasn't bothered about them, but at a knock-down price of £250,000."

In Denmark, the National Association of Neighbours of Wind Turbines say that most estate agents estimate a 25 - 30 % fall in property value when turbines are put up nearby.

Return to [Home Page](#). Return to start of [Case Against Windfarms](#)

L. THE EFFECT ON BIRDS

Planning Policy Guidance 22 (PPG 22) which deals with planning considerations relating to the development of renewables states: "Evidence suggests that the risk of collision with moving turbine blades is minimal both for migrating birds and for local habitats." The simple fact is, however, that turbine blades have killed birds in large numbers, which is not surprising when it is remembered that turbine blades weigh up to 1.5 tonnes and their tips are travelling at 180 mph.

At Tarifa in Spain significant numbers of birds of 13 species protected under European Union law have been killed by turbines (*Windpower monthly* 2.2.94).

The wind turbines in Altamont Pass in California have on average killed 200-300 Redtail Hawks and 40-60 Golden Eagles each year, while it is estimated that 7000 migrating birds a year are killed at other wind turbine sites in Southern California.(California Energy Commission).

The Times reported in May 1999 that Scottish Power was to invest two million pounds creating a new grouse moor away from a proposed wind "farm" to encourage a pair of Golden Eagles to hunt where they would not be at risk from turbine blades. At Largie, Kintyre, Scotland, the inspectors at the Scottish Office overturned a planning consent for wind turbines at an Inquiry in November 1998 because of danger to the population of White-Fronted Geese.

In December 1999 English Nature objected to the erection of wind turbines near the Ouse Washes and the Nene Washes in East Anglia because of a number of potential hazards for wildfowl, including habitat loss and degradation, indirect disturbance from noise, potential for mortality due to collision with wind turbines, effect on nocturnal patterns of movement and danger to birds during periods of poor visibility and severe weather.

English Nature in making the above objection cited studies by Winkelman and Karlsson which respectively recorded 0.54 collisions per turbine per day during the heaviest period of diurnal migration at Oosterbierum in the Netherlands, and 49 dead birds at one turbine during one night of migration at Nasudden in Sweden.

Two European Union directives, the Habitats Directive and the Birds Directive, apply to proposed developments which are likely to have a significant effect on designated habitat and breeding sites. These directives have been transposed into UK law by Regulations 48, 49 and 54 of the Conservation (Natural Habitats &c) Regulations 1994. They would appear to constrain wind "farm" development around such sites. In Holland, 49 new bird sanctuaries have been designated in February 2000 and these are proving a major impediment to plans for turbines.

Return to [Home Page](#). Return to start of [Case Against Windfarms](#)

M. PUBLIC OPINION

The wind industry constantly claims that surveys demonstrate that 70% of the population are in favour of the technology. The surveys they refer to, however, are of a general nature: they do not ask whether a wind farm on a specific site would be a good idea and it is obviously possible to support the idea of wind energy in principle while rejecting it as an option in a particularly fine landscape or on an Site of Special Scientific Interest. The industry uses general approval to support its plans to industrialise even the most sensitive locations.

Where surveys have been site-specific the results are very different. For example, a referendum of the residents of Brora and Helmsdale in Sutherland was undertaken in the summer of 1996 by the Electoral Reform Society. To the question: 'Do you want wind turbine towers to be built on the coastal hills of East Sutherland between Brora and the Ord of Caithness, now or in the future?' 68% said **No** (2179 ballot papers dispatched, 1609 returned, 509 Yes, 1098 No, 2 invalid). Polls in Montgomeryshire have shown similar results.

Opinion surveys are useful tools for pressure groups but not a sensible basis for sound planning, since they are often snapshots of ill-informed opinion. For example one of the motoring organisations conducted a poll in 1994 which found that 84% favoured more road building as an answer to congestion. Traffic surveys have demonstrated that new road building increases car use and in the medium to long term leads to equal and then increased congestion. Similarly, respondents to surveys about wind can be shown to be ill-informed, believing that wind-generated electricity is cheap or even free, or that wind "farms" are an alternative to nuclear power stations.

Informed opinion is very much more critical of wind power development. Planning committees, advised by professional planning officers who have objectively to evaluate every aspect of a proposal, have rejected more than 80% of wind turbine applications, those applications which were successful generally being for small numbers of turbines. Inspectors at appeal have usually upheld the planning refusals. The government gave licences for 2400 MW of wind power under the last three rounds of the Non-Fossil Fuel Obligation and the Scottish Renewables Obligation; by March 2000, only 200 MW had got through the planning process because well informed planners and inspectors considered the environmental impacts too big and the clean energy benefits too small to allow the rest.

A milestone decision has been that relating to Barningham High Moor in County Durham. The local planning committee on two occasions rejected National Wind Power's plans for turbines on a site of national archaeological importance overlooking the Yorkshire Dales National Park and the North Pennines Area of Outstanding Natural Beauty. At appeal, the government's inspector did in effect a cost/benefit analysis and judged that "Demonstrable harm would be caused to the appearance of the landscape and to the enjoyment of users of the National Park ... Conversely, the amount of energy generated would be small and the pollution savings correspondingly few."

The National Trust, on 19 May 1999, issued a statement denouncing the "false hopes and flawed solutions" offered by many "green energy" schemes, particularly wind farms. "In a world where commercial decisions are dominated by the global market place, wildness is too easily under-valued. In the present context of concern over climate change and the drive for clean energy, we are offered a new resource - wind power. We have to be certain that, if we exploit the wind, loss of the wild is not too high a price to pay." (*A call for the Wild* - National Trust, 1999).

The National Trust and the Countryside Commission (now The Countryside Agency) joined forces to urge the government to recognise that wind "farms" are industrial and commercial developments and to keep them out of undegraded landscapes. The Campaign for the Protection of Rural Wales has demanded an end to further wind

development within the Principality. The Council for the Protection of Rural England has criticised the government for giving the lion's share of renewables contracts to wind farms in the 4th round of the Non-Fossil Fuel Obligation because of the visual damage to landscape which these developments cause. The Ramblers Association, the Countryside Council for Wales, Scottish Natural Heritage, the Association for the Protection of Rural Scotland and the Council for National Parks have all condemned the way in which wind power is being developed.

Former leader of the Labour Party Neil Kinnock wrote in 1994: "My long-established view is that wind-generated power is an expensive form of energy. It can only provide a very small fraction of the output required to meet total energy needs and it unavoidably makes an unacceptable intrusion into the landscape."

In 1998 the House of Commons Trade and Industry Committee reported (*Energy Policy*): "...the very different environmental problems that the development of renewable sources of energy can entail cannot be overlooked. The environmental impacts of wind power projects have become increasingly apparent during the 1990s." The committee cited visual and aural impact and damage to soil structure from the construction process.

In September 1994 the Public Accounts Committee of the House of Commons cast doubts on the economic viability of wind-generated electricity: "We consider that it is very doubtful that the relatively modest increases in new electrical generation justify the large sums spent."

In 1998 the Norwegian Government commissioned a report on the experience of wind energy in Denmark in order to inform its own decisions on developing the technology. It noted: "serious environmental effects, insufficient production [and] high production costs."

Perhaps the most authoritative critique of wind-generation of electricity to date is the Darmstadt Manifesto on the exploitation of wind energy in Germany. Its authority derives from its signatories - over 100 leading academics in fields including Mathematics, Electrical Engineering, Physics, Medicine, Chemistry, Mechanical Engineering and Thermodynamic Science, as well as Land Management, Agricultural Science and Geography. Germany has now more than 7,000 wind turbines and development continues apace under a government in which the Green Party is a partner. Faced with this assault on what the authors call "cultural landscapes" and fearing that young people are "growing up into a world in which natural landscapes are breaking up into tragic remnants" the manifesto undertakes a cost/benefit analysis of wind energy. They write that despite the proliferation of turbines in Germany "less than 1% of the electricity needed is produced or only slightly more than one-thousandth of the total energy produced." Equally, "the contribution made by the use of wind energy to the avoidance of greenhouse gases is somewhere between one and two thousandths. Wind energy is therefore of no significance whatever either in the statistics for energy or for those of pollutants and greenhouse gases." They draw attention to the fact that total energy consumption in Germany is growing about seventy times faster than the production of wind energy. "Wind energy is running a race which is already lost in an economic order orientated towards growth." Not only does investment in wind (with its low energy yield and high costs) divert capital pointlessly from much more important environmental protection measures, but by creating the false perception that a decisive contribution is being made to a clean environment and a guaranteed supply of energy, it allows consumers to feel exonerated from the duty of making energy savings.

Return to [Home Page](#). Return to start of [Case Against Windfarms](#)

N. WHY THE NEW PHENOMENON OF WINDFARMS?

Not because of the innate soundness or economic sense of the technology - after all, the air screw generator has been available for more than a hundred years - but because in 1990 the Conservative government introduced subsidy for wind "farms" through the Non-Fossil Fuel Obligation, and, a few years later, through the Scottish

Renewables Order. A Department of Trade and Industry statement (24.8.94) confirmed that "All wind energy developments throughout the world are subsidised in one form or another." Although the guaranteed price per unit of wind-generated electricity varied from one round of NFFO and SRO to another, wind energy supplied in the UK over the last ten years has not been cheap, let alone free. It has cost anything from 116% to 440% of the price of conventionally generated electricity. Under the new arrangements announced by the government this year, the effective price for wind energy will be 4.3p per unit as compared with a base load price of only 2.3p per unit.

A naive customer of SWEB wrote to the company in 1994 asking for a reduction in his electricity bill since he lived next door to the wind turbines at Cold Northcott, which generated cheap electricity. The Tariffs and Supplies manager replied: "Your electricity charges would be significantly more expensive if they reflected the full cost of supplying electricity from the wind turbines nearby. These wind turbines are heavily subsidised by coal-, gas- and oil-fired generation with a levy on electricity prices which the government introduced and which supports most generation from renewable sources." (Letter, 28.3.94)

The Electricity Regulator Stephen Littlechild, in his submission to the government's consultation on renewables, wrote in 1998: "The government is presently carrying out a review of what would be necessary and practicable to achieve 10 % of the United Kingdom's electricity needs from renewables by the year 2010. Such a target might be achieved by continuing NFFO support for some technologies, including onshore wind, offshore wind and energy crops. However, the cost of meeting the target in these ways might amount to some £11 - £15 billion, requiring a levy rate of between 6 and 8 per cent over 15 years. It is for consideration whether the benefits of renewable energy justify incurring costs on such a scale."

With such huge sums on offer, it is not surprising that developers have climbed on board. In the main, they are the privatised utilities and other multi-national companies. The big names in wind energy development have been Scottish Power, Manweb, SWALEC and National Wind Power, a subsidiary of National Power. They are not "green" companies, and their other activities often add to atmospheric pollution larger amounts of noxious gases than their wind "farms" save. In April 1995 Scottish Power proposed to double its coal burn at three of its power stations by 2000. That proposal would lead to a further 3 million tonnes of CO₂ being released into the atmosphere. National Power, owner of National Wind Power, fought hard for consent to burn orimulsion, one of the dirtiest known fuels, at its Pembrokeshire power station. Had it succeeded, SO₂ emissions would have dwarfed any SO₂ savings from UK wind turbines. No doubt these large companies believe that their wind "farm" activities provide good public relations, but the truth is that they are in the wind business for profit, not concern for the environment. In November 1993 *Wind Power Monthly*, the magazine of the wind industry and wind enthusiasts, described Britain's wind industry as being "an industry in search of fast bucks today and never mind tomorrow." Nothing has changed since then.

Return to [Home Page](#). Return to start of [Case Against Windfarms](#)

O. GOVERNMENT POLICY

Government policy on wind and other renewable energy sources is set out in *New and Renewable Energy - prospects for the 21st Century (Conclusions in Response to the Public Consultation.)* This followed a manifesto commitment to a strong drive to develop new and renewable energy sources.

The government has a ten year strategy to ensure, through a rising series of targets, that 10% of UK electricity is generated from renewable sources by 2010. These sources are diverse and include hydro, on- and off-shore wind, energy crops, waste incineration, landfill gas and other biomass.

The Utilities Bill, now going through Parliament, provides the statutory powers for obliging all electricity suppliers in England and Wales and - separately - Scotland to

supply specific proportions of their electricity each year from renewable sources, based on the quantity of electricity they supplied the previous year. 2% of UK supply is said already to come from renewables. The government expects the obligation to rise to 5% by 2003 and to 10% by 2010, and to apply until 2025. If suppliers fail to fulfil their obligation to buy the appropriate proportion of their electricity from renewable generators, they may instead buy green energy certificates from those with a surplus of renewable energy or exercise a 'buy-out' option by paying a penalty each year instead of supplying 'green' electricity. The DTI has indicated that the penalty will be 2 pence per unit.

The penalty price effectively sets a price cap for renewables at 4.3 pence per unit, since the pool or base load price for electricity is about 2.3 pence per unit. In other words, a supplier failing to meet its obligation to provide 10% of its electricity from renewables would make up the shortfall by buying from conventional generators at 2.3p and paying a further 2p in penalty. If renewables cost more than 4.3 p per unit, it is cheaper for the supplier to buy conventional electricity and pay the penalty. Curiously, the revenue from the penalty goes back to the suppliers, though the money may be repaid to them in proportion to the amount of green energy they have supplied. This has yet to be decided.

The 4.3p per unit price cap makes significant off-shore wind development unlikely, since the associated costs of off-shore generation - construction difficulties, maintenance, cabling, grid connections - will put the price above that level. The government is said to be considering supplementary support for off-shore wind. Another feature of the newly announced policy is that renewables are to be exempt from a new tax known as the Climate Change Levy (CCL) which is to come into force in April 2001 adding 0.43 p per unit to the business use of electricity from fossil or nuclear fuel generation.

Finally, all UK regions will be required to prepare renewable energy assessments of their resources and set regional renewable energy production targets (see Windfarms and the Planning System below).

Return to [Home Page](#). Return to start of [Case Against Windfarms](#)

P. EUROPEAN UNION POLICY

The European Commission has been trying for some time to implement a directive on renewable energy. Two proposals had to be abandoned after opposition from member states, industry and environmental groups. Finally on 10 May 2000 the Commission announced its proposals.

The draft law aims to double the proportion of 'green' energy from 6% to 12 % of primary energy supply by increasing the share of renewably generated electricity from 14% to 22% by 2010. Non-binding "indicative" national targets will be set to ensure that the EU overall target is met. Member states will have to report annually on their progress and the Commission will propose mandatory targets if national goals are inconsistent with the EU target. For the UK, the Commission's target is 10% by 2010.

Member states will have to "reduce regulatory barriers" which are seen as hampering renewables development - including establishing a fast track through planning procedures. What the E U calls "regulatory barriers" were formerly known as hard-won safeguards for the precious asset of undegraded landscape - safeguards which, by-and-large, have worked and have defeated one inappropriate wind "farm" proposal after another.

Doubtless the finalisation of this directive will be delayed as governments argue about their share of the burden. It must be remembered too that there are renewables other than wind, though many of them have a major environmental cost attached just as wind does. Nonetheless, if there is not to be an unconsidered and unregulated growth in the deployment of wind turbines thanks to an E U directive, countryside organisations and individuals must lobby their MEP, the government and their MP.

Return to [Home Page](#). Return to start of [Case Against Windfarms](#)

Q. KYOTO

At the summit conference in Japan two years ago the industrialised world agreed to reduce emissions by 5% by 2010, but even that target has run into problems. By December 1999 only 16 nations had ratified the protocol. The US, which has 5% of the world's population and produces 20% of its pollution, shows little sign of co-operating with the target. Meantime, countries like India and China in their race to industrialise are massively increasing their coal-burn. Kyoto does not affect the UK because we will achieve more stringent targets anyway, thanks to our "dash for gas", but it throws into stark relief the futility of our covering our wilderness areas with ineffective turbines while major polluters squander the infinitesimal savings we make. Return to [Home Page](#). Return to start of [Case Against Windfarms](#)

R. WIND 'FARMS' AND THE PLANNING SYSTEM

Because wind energy is uneconomic, its development depends on subsidy. Wind developers have had to jump two hurdles before erecting a wind "farm" - first to secure a contract from the DTI which provided a guaranteed market and a premium price for the electricity generated, and secondly to secure planning consent. The award of a contract gave no preferential treatment under the planning system. In clarification, Minister for Planning Richard Caborn wrote in June 1998: "...wind energy developments are subject to exactly the same planning controls as any other form of development ... The government wants to encourage the development of clean and renewable energy where that is economically attractive and environmentally acceptable."

National policy for renewable energy is already part of the planning process through various government guidance notes to planning authorities: Planning Policy Guidance Note 22, *Renewable Energy*; Planning Guidance (Wales) Planning Policy First Revision April 1999; Planning Guidance (Wales) Technical Advice Note (Wales) 8 *Renewable Energy*; National Planning Policy Guideline 6 *Renewable Energy* (Scotland); Planning Advice Note 45 *Renewable Energy Technologies*. Planning authorities must have regard to these guidelines in drawing up their Local Development Plans, to which recent legislation has given pre-eminence. But the Countryside Act 1968 imposes a responsibility to preserve the countryside and local government has become increasingly aware of the tourist and amenity value of undegraded landscape. Thus Local Development Plans have tended to restrict industrial development to specific areas, usually those already industrialised. This makes life difficult for wind developers who seeks sites precluded by the local plan. They are required to find "substantive material reasons" why restrictions should be set aside. The only plausible reason might be the reduction in fossil fuel pollution, but the reduction achieved by even the largest wind "farms" is so minuscule as to be in no sense substantive.

The early wind "farm" proposals which had won DTI contracts under the Non-Fossil Fuel Obligation tended to get planning permission without much difficulty, partly because PPG22 indicated that renewable energy developments were in the national interest. However, contracts for wind farms were awarded on the basis of competitive price tender; the better the wind speed of the site chosen, the cheaper the wind-generated electricity. The best wind speed sites tend also to be the best landscapes, so as successive rounds of NFFO pushed the price down, developers were constrained to choose almost exclusively fine landscapes for their proposed wind farms. Planning committees became more reluctant to pass the proposals. The government gave licences for 2400 MW of wind power under the last three rounds of the Non-Fossil Fuel Obligation and the Scottish Renewables Obligation; by March 2000, only 200 MW had got through the planning process because well informed planners and inspectors considered the environmental impacts too big and the clean

energy benefits too small to allow the rest. The wind industry began to howl in frustration and demand that wind be given a fast track through the system. The government's new policy, announced in February 2000, is to require all UK regions to prepare renewable energy assessments of their resources and set regional renewable energy production targets. The government hopes that this will provide a strategic approach to renewables development to replace the haphazard scramble for sites which the NFFO system generated. The assessments and targets should provide a framework for development plans which will help to determine decisions on individual energy projects. Whether the assessments and targets turn out to be a constraint or a facilitating measure for wind developers remains to be seen, but until the new system is in place we must assume that the current system prevails. There are still a significant number of NFFO and SRO projects which have yet to go through the planning process.

Return to [Home Page](#). Return to start of [Case Against Windfarms](#)

S. THE FUTILITY OF SUPPLY-SIDE SOLUTIONS

We cannot reduce emissions while our consumption of energy grows. The CO₂ released during the manufacture of wind turbines and the construction of a wind "farm" gives an average CO₂ cost of 50 g per unit generated over the lifetime of a turbine (cf. 400 g for gas-generated electricity, 7 g for nuclear). In Germany, with 7,000 turbines, energy consumption is growing seventy times faster than the production of wind energy as living standards rise in former East Germany. So, Germany is unlikely to meet its CO₂ reduction targets, according to the Institute for Economic Research DIW (report *ENDS Daily* 10.2.00). But the German Interministerial Working Group on Climate Protection reported in April that "Domestic energy efficiency has the greatest potential to achieve desired reductions in greenhouse gas emissions." (report *ENDS Daily* 13.4.00)

America and Europe are profligate in their use of energy. America has approximately 5% of the world's population and is responsible for about 20% of its energy consumption. In the UK we use 5 times more electricity than we did 50 years ago, and consumption rises continually - since 1992 by about 10% every four years. To TVs, fridges, cookers and washing machines we have added as standard freezers, micro-waves, video players, computers, mobile telephones which need recharging, fax machines, answering machines, set-top decoder boxes for digital TVs, a range of power tools for house and garden and more and more. Often these goods are duplicated - how many households have more than one TV, more than one mobile phone?

Electricity generation is only one source of greenhouse gas emissions - and probably accounts for about one-third of them in the UK. Traffic growth on the roads and in the air are the fastest growing sources of such emissions. How many families run two or three cars? How many of us fly to distant destinations on cut-price air tickets? Each year, 110,000,000 million people fly from airports in the South East of England. At Heathrow there are flight movements every 90 seconds throughout the day. The comforts that the First World takes for granted are, reasonably enough, coveted by poorer countries and globalisation is leading to a growth in the economies of formerly poor countries which will allow their populations to acquire the same goods as the rich and consume energy in the same profligate way. Between 1990 and 2000 ten of the poorer countries of Asia and Latin America have doubled their standard of living. Their populations total 1.5 billion people. It is unthinkable that the countries of America and Europe should deny energy use to others while continuing to abuse energy themselves. And it is ludicrous to imagine that the teletubby technology of the wind turbine is going to supply the needs of the world. In England growth in electricity use each year is about 12.5 times the production of all of our wind turbines; we would have to build more than 7,000 turbines a year to keep pace with growth in demand.

What is shocking is how much of our energy use is wasted, how little attention the government gives to conserving energy and how growth in consumption is tacitly encouraged. About 30% of our electricity consumption and about 40% of our energy consumption is in the home and of this 60% is wasted (*Sunday Times*, 23 April 2000). Keeping TVs, stereos and other appliances on stand-by consumes the electricity output of two average-sized power stations. If each household replaced the conventional electric bulb most used with a low energy bulb, another power station could shut and 1.5 million tonnes of CO₂ could be saved.

The last government calculated (Energy Paper 58, HMSO 1989) that an immediate, *self-financing* reduction in energy consumption of 30% could be achieved by better management or investment in energy saving measures.

And yet in this key area, shockingly little is done. With privatisation and de-regulation energy prices have fallen significantly in real terms. VAT is charged on electricity and gas bills at 5%. On insulation materials it is charged at 17.5%.

Road traffic is the fastest-growing UK source of CO₂ emissions. The government signally fails to tackle this problem. It has backed away from road-use pricing. For the first time since 1992, in an effort to appease motorists who complain about fuel prices rising above the rate of inflation, it has tied petrol duty increases to inflation. The Chancellor is introducing instead (March 2001) a graduated road tax, where the most polluting cars pay more than relatively clean ones, though the measure will only apply to new cars. A Daihatsu Kuore will be taxed at £100 per year. A Rolls Royce will be taxed at £180 per year. Since a new Rolls Royce costs £250,000 few potential owners are likely to be put off by the tax hike. But a Rolls Royce travelling at 60 mph emits 0.044 tonnes of CO₂ in an hour - half the CO₂ saved in an hour by a 500kW turbine.

We are forced to draw the conclusion that the government does not regard greenhouse gases and global warming as a very serious problem - certainly not serious enough to offend voters by making energy use expensive or taxing personal transport. Instead it puts up turbines which, statistically, do nothing significant to tackle the problem, but which are highly visible and, as they will note from the wind industry's opinion polls, popular with 70% of the voters. The danger is, of course, that the naive consumer will see the turbines, consider the problem solved and turn up the thermostat to enjoy his cheap power to the full.

Wind Turbines vs. Energy Saving - a case study

There are 1,628,000 houses in the UK with pitched roof and no roof insulation*
3780 kWh of energy are lost by each such house each year.*

Insulation to 1990 Building Regulations standard would save 3375 kWh p.a.*

The annual output of a 750 kW turbine is 1.64 m units.

Insulating 485 houses would save that amount of energy each year.

New funding arrangements will give wind energy a subsidy of 2p per unit.

The annual subsidy of the turbine will be £32,850.

The cost of insulation is a one-off £122 per house, say £60,000 for 485 houses.

Over the 100 year life of the houses, the energy saving cost averages £600 pa

Saving pollution by insulation is 55 times more cost-effective than saving it by wind turbines!

*Source: Pilkington Insulation, UK Mineral Wool Association

Return to [Home Page](#). Return to start of [Case Against Windfarms](#)

T. HOW CAN ELECTRICITY NEEDS BE MET?

Even if we reduce our electricity consumption by as much as 50% and tackle emissions from road and air traffic there will still be a need to generate electricity, reliably and in large quantities. Wind cannot take a significant role. The most environmentally-friendly solution at the moment would seem to be Combined Cycle Gas Turbine generation. The Baglan CCGT will produce 500 MW of reliable power and cover 15 acres. Carno wind "farm", said to be the largest in Europe, sprawls

over 1500 acres and produces an average output of 10 MW. Baglan will be the most efficient and cleanest of its kind in the world.

Power Gen's portfolio of CCGT plant has reduced the company's emissions by 11,000,000 tons of CO₂ a year already - one third of the UK's target for CO₂ reduction. That is the equivalent of the CO₂ savings of 16,000 wind turbines of 500 kW installed capacity. Moreover, it is perfectly possible to capture 90% of the CO₂ created during the gas-fired generation of electricity and pump it into exhausted natural gas fields. According to the Dutch newspaper *Algemeen Dagblad* (18.02.00) that would cost an additional 3 Dutch cents per unit and would make gas generation not only cheaper than wind generation, but also cleaner, once the CO₂ created during the manufacture and construction of a wind "farm" is taken into account. Gas-fired generation raises a further interesting possibility - that of replacing the national grid of power transmission lines with a grid of gas pipelines feeding local CCGTs, reducing both transmission loss and the visual intrusion of pylons.

There are serious questions to be answered: what happens when the nuclear plants have to close and we lose a virtually CO₂-free 30% of our generation? How is the developing world going to meet its generation targets? With dirty local coal? With nuclear? Erecting a few thousand wind turbines in Britain is simply fiddling while the world burns, and, as we and others have suggested elsewhere, the appearance of these machines develops the dangerous perception among the badly informed that the problem is being addressed and that they need do nothing.

Return to [Home Page](#). Return to start of [Case Against Windfarms](#)

U. THE VALUE OF LANDSCAPE

Until 1991 and the arrival of wind "farms" in our countryside, few voices questioned the importance of wild, unindustrialised landscape as a national asset - proprietors of quarries, developers of open-cast mines were blinded by a concern for profit, but anyone with a concern for the environment sought to preserve wilderness areas both from a desire to protect their fragile eco-systems and from a recognition of their capacity to enrich human life through spiritual and poetic inspiration and through self-sufficient adventure.

Since then, however, the issue of the wind turbine has led a section of the "green" movement to dismiss landscape as a middle-class or NIMBY concern, because there is no possibility of large numbers of 300 foot high machines with rotating blades being absorbed into the landscape without dominating it and giving it an industrialised aspect. Jonathan Porritt's view is typical: "The modern wind turbine is a mighty intrusive beast. It's not into nestling, blending in or any of those other clichés beloved of rural romantics."

The founder of the National Parks movement, John Muir, wrote: "Thousands of tired, nerve-shaken over-civilised people are beginning to find that wilderness is a necessity and that mountain parks and reservations are useful not only as fountains of timber and irrigating rivers, but as fountains of life."

If we are to throw away this non-renewable but spiritually renewing resource it must only be for a benefit of very great significance. 10,000 of the very largest turbines covering our uplands might reduce UK carbon dioxide emissions by 2-3% and global emissions by 0.05%. Even that tiny gain would be squandered in a very few years of unrestrained growth in electricity consumption.

It would be folly and a criminal neglect of our duty to future generations to industrialise our last wild places temporarily to reduce global CO₂ emissions to 99.95% of their current levels when there are more effective strategies left neglected.

Return to [Home Page](#). Return to start of [Case Against Windfarms](#)

V. CONCLUSION

The British government and governments around the world face very tough decisions in the next two decades if they conclude that serious action is required to tackle the emission of so-called 'greenhouse' gases. A number of scientists are speculating that emissions will have to be cut by 60% (the Kyoto Protocol called for 5%) to have any effect on global warming (*Costing the Earth* BBC Radio 4 11 May 2000). At the same time, nuclear power stations of the existing generation will reach the end of their working lives in about 2010: they currently provide about 30% of UK electricity without emissions.

There will have to be steep rises in energy prices for consumers who, since privatisation and deregulation, have become used to ever-cheaper energy.

There will have to be draconian restrictions on private car use and the end of cheap air travel - these are the two fastest growing sources of CO₂ emission.

Either a new generation of nuclear power stations has to be foisted on an unwilling public or a reliable, non-intermittent energy source has to be found to replace them and provide nearly a third of our supply: what is it to be?

Country Guardian argues that tinkering at the edges of the problem by supporting a technology like wind, which is unpredictable, intermittent and dependent on machines whose output is derisory, is a dangerous distraction and a piece of 'green' window dressing designed to allow the government to avoid the problem.

It is pointless to address difficulties caused by a profligate use of energy by creating another polluting source of energy supply. It is unacceptable that our last great landscapes should be heavily industrialised in a futile political gesture. Wilderness is a non-renewable resource crucial to the sanity of a pressurised and overcrowded world. It must not be sacrificed for a derisory and largely illusory contribution to clean energy supply when there are far more effective *and* cost effective strategies.

May, 2000

Country Guardian owes thanks to many people for the contributions which they have made to this paper. If we single out for particular gratitude Ted Luscombe, John Dodds and the late Geoffrey Ratcliff it does not in any sense diminish the help of the others.



Draft

NSW Wind Energy

EIA Guidelines

June 2002

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Executive Summary

This guideline identifies some important factors to be considered when undertaking environmental assessment of wind farm projects.

The undertaking of environmental assessment and the preparation of an environmental impact assessment (EIA) document such as an Environmental Impact Statement (EIS) or Statement of Environmental Effect (SEE) should be preceded by early effective consultation and technical discussions with relevant government agencies and councils.

There should also be an early evaluation of alternative sites, taking the factors in Part 4 of this guideline into consideration. A high priority should be given to:

- considering environmental factors in site selection
- evaluating alternative sites, design and technical options
- ascertaining the suitability of the intended location.

The environmental implications of options should consider in the analysis of alternative design and management practices. The justification for the selection of the preferred options should consider biophysical, social and economic factors, and the consistency with ecological sustainability principles.

The assessment of the project should focus on key environmental issues. These issues should be identified early in the EIA process, usually through consultation with the local council, government agencies and the community. The assessment process should clearly identify the environmental (including biophysical, social and economic) costs and benefits of the proposal.

Key issues for wind energy schemes usually include:

- selection of an appropriate location
- minimisation of landscape and visual amenity impacts
- minimisation of noise and electromagnetic disturbance impacts
- minimisation of adverse impacts on aerial fauna
- minimisation of land use conflicts.

The EIS or SEE should outline commitments to the ongoing environmental management of the proposal, including monitoring.

The level of analysis of individual issues in the EIS or SEE should reflect the level of significance of their impacts. The analysis should focus on key issues. The information in the SEE or EIS should be accurate and presented clearly and concisely. There should be emphasis on quality and not quantity.

Contents

1.	Purpose and scope of the guideline	4
1.1	Background	4
1.2	Wind farms covered by the guideline	4
1.3	Approvals to operate a wind farm	5
	<i>EIA under Part 4</i>	5
	<i>EIA under Part 5</i>	6
	<i>Matters of National Environmental Significance</i>	6
2.	Factors to consider when undertaking EIA	8
2.1	Ecologically sustainable development	8
2.2	Early consideration of the strategic context	8
2.3	Early evaluation of options	9
2.4	Identifying issues	10
2.5	Prioritising issues	11
2.6	Impact analysis, prediction and presentation	11
3.	Consultation	16
3.1	Benefits from effective consultation	16
3.2	Consultation with government authorities	16
	<i>Consultation with Local Councils</i>	16
	<i>Consultation required under legislation</i>	17
	<i>Planning Focus Meetings</i>	17
3.3	Consultation with the community	18
	<i>Who to consult</i>	18
	<i>Consultation with prospective landowners</i>	19
	<i>Community Consultation Program</i>	19
4.	Site selection procedures	21
4.1	Importance of a rigorous site selection process	21
	<i>Benefits of site evaluation process</i>	21
	<i>An iterative process</i>	21
	<i>Potential mitigation measures should be considered</i>	22
	<i>Report results of site evaluation in EIS/SEE</i>	22
4.2	Stage 1 Preliminary site evaluation	23
	<i>Permissibility of land use</i>	23
	<i>Environmentally sensitive areas</i>	23
	<i>Compatibility with surrounding land uses</i>	23
4.3	Stage 2 Preliminary site evaluation	24
	<i>Project information required at this stage</i>	24
	<i>Environmental factors needed at this stage</i>	24
	<i>Community consultation at this stage</i>	24
	<i>Operational Requirements</i>	25
	<i>Infrastructure Issues</i>	25
	<i>Community Issues</i>	25
	<i>Noise issues</i>	25
	<i>Landscape and visual issues</i>	25
	<i>Flora and fauna issues</i>	25
	<i>Heritage issues</i>	25
	<i>Geological and soil issues</i>	25
	<i>Cumulative issues</i>	25

5.	Summary of EIS requirements	26
6.	Specific requirements for an EIS	27
A.	EXECUTIVE SUMMARY	27
B.	THE PROPOSAL	27
1.	<i>Objectives of the proposal</i>	27
2.	<i>Consideration of alternatives and justification for the preferred option</i>	27
3.	<i>Description of the proposal</i>	28
4.	<i>Site layout</i>	28
5.	<i>Construction issues</i>	28
C.	THE LOCATION	30
1.	<i>Planning context, site description and locality information</i>	30
2.	<i>Overview of the receiving environment</i>	30
D.	IDENTIFICATION AND PRIORITISATION OF ISSUES	31
1.	<i>Overview of the methodology</i>	31
2.	<i>Outcomes of the process</i>	31
E.	ENVIRONMENTAL ISSUES	32
1.	<i>Greenhouse and Energy Issues</i>	32
2.	<i>Landscape and visual issues</i>	33
3.	<i>Noise issues</i>	33
4.	<i>Air quality issues</i>	34
5.	<i>Soils, drainage and geological issues</i>	34
6.	<i>Flora and fauna issues</i>	35
7.	<i>Heritage issues</i>	36
8.	<i>Infrastructure and utilities issues</i>	38
9.	<i>Social issues</i>	39
10.	<i>Economic issues</i>	40
11.	<i>Cumulative issues</i>	41
F.	MITIGATION AND MANAGEMENT MEASURES	42
1.	<i>List of approvals and licences</i>	42
2.	<i>Outline of performance commitments and the environmental management principles</i>	42
3.	<i>Outline of environmental management plan (EMP)</i>	42
4.	<i>Outline of Monitoring Program</i>	43
5.	<i>Outline of Community Consultation Program</i>	43
6.	<i>Land Use Conflict Avoidance Strategy</i>	43
G.	JUSTIFICATION FOR THE PROPOSAL	45
Appendix 1	Schedule 2 - Environmental Impact Statements	46
Appendix 2	EIA procedures under the EP&A Act	7
Appendix 3	Threatened Species Conservation Act	47
Appendix 4	National Environmental Significance	50
Appendix 5	Consultation and approvals	51
Appendix 6	Schedule 3 – Designated Development	54
Appendix 7	Sustainability Principles Checklist	55
Appendix 8	References	57

1. Purpose and scope of the guideline

1.1 Background

A major function of the environmental impact assessment process is to provide information to the applicant, community and decision-makers on the potential environmental impacts of a proposal. This guideline outlines the matters that an environment assessment of a wind energy proposal may need to address.

The guideline considers the following specific matters:

- factors to be considered in the location of a wind farm
- issues relevant for environmental assessment of wind farms
- consultation to provide for an informed and transparent process.

Not all matters outlined in this guideline will be applicable to every wind energy proposal. In many cases, wind energy proposals may not trigger the need for an Environmental Impact Statement (EIS), and a Statement of Environmental Effects (SEE) should be prepared to document the assessment of the project impacts. In cases where an EIS is required, the issues identified in this guideline are equally applicable.

The SEE or EIS should be tailored to suit the potential impacts of the proposal. It is essential to focus on key issues. If the SEE or EIS addresses the relevant matters identified in this guideline, there should be sufficient information for the assessment of most wind energy proposals. This guideline should be read in conjunction with SEDA's NSW Energy Wind Handbook 2002 and the AusWEA's Best Practice Guidelines for Implementation of Wind Energy Projects in Australia (2002)

1.2 Wind farms covered by the guideline

Wind energy facilities generate power from the movement of air resulting from thermal gradients and the earth's rotation. The wind speed is governed by two main factors – prevailing weather systems plus local metrology and the influences of topography such as funnelling through valleys or acceleration over ridges. For each doubling of wind speed there is an eightfold increase in available energy.

Wind farms range from individual or small clusters of turbines perhaps for local use to large numbers of turbines with connections to the national grid. Land is usually leased for the forecasted life of the project. This creates a long-term income for the landowner and does not generally interfere with the ongoing operation of the farming activities.

Wind farms are unavoidably conspicuous, and therefore it is essential that projects are carefully sited and sensitively developed. Wind turbines require careful layout to minimise visual impact, as well as to take advantage of local topography to maximise wind availability.

There are two basic types of wind turbine design – horizontal and vertical axis. At present, the horizontal axis turbine, with blades rotating atop a tall tower, is the most common type world-wide. Typically commercial wind turbines have the capacity to generate from 600 kW to more than 2 MWs of power when operating under optimum conditions.

A conventional horizontal axis wind turbine consists of four main elements:

- concrete foundations - generally below ground
- a tower, generally of steel tubular or concrete construction.
- a turbine on top of the tower which houses the mechanical and electrical components of the turbine
- the rotor, consisting of a hub and blades.

Ancillary structures associated with wind farms might include:

- (i) overhead transmission lines or underground electricity cables
- (ii) substation including transformer and switchgear
- (iii) a small building(s) for operational purposes
- (iv) access roads (possibly downgraded after construction)
- (v) anemometer masts (to measure wind conditions)
- (vi) public viewing or tourist facilities.

Where the transmission lines form part of the proposal, this guideline should be used in conjunction with the Department of Planning's *EIS Guideline – Network Electricity Systems and Related Facilities*.

1.3 Approvals to operate a wind farm

Local Environmental Plans and other environmental planning instruments prepared under the *Environmental Planning and Assessment (EP&A) Act* establish whether a particular project is permissible in a particular location and whether development consent is required for its operation.

It is important to consult early with the relevant local council to determine whether a wind farm is permissible in the proposed location.

Under Part 4 of the EP&A Act, wind farm proposals will usually require development consent. If development consent is required, a development application must be lodged with the "consent authority", usually the local council.

The Minister for Planning is the consent authority for State significant projects in NSW. At this time, the Minister has not made a declaration in relation to making major energy generating facilities State significant, though a number of declarations have been made in relation to making major energy projects State significant. As a guide, the Minister has declared projects of more than \$20M capital value to be State significant in other industrial sectors.

EIA under Part 4 A development application must be lodged with supporting information that should include the landowner's consent and an EIA document (either a SEE or EIS). Appendix 2 provides a summary of EIA procedures.

Proposals which are likely to significantly affect the environment may be *designated* under Schedule 3 of the EP&A Regulation 1994 or under an environmental planning instrument. Wind farm proposals which produce more than 30 megawatts of electrical power are *designated development*. However, environmental planning instruments may also designate projects such as those likely to disturb environmentally wetlands mapped under State Environmental Planning Policy (SEPP) 14- Coastal Wetlands.

If a development is designated, an EIS must be prepared and lodged with a development application. If the proposal is not designated, a SEE must be submitted with the development application. This guideline is equally applicable in the preparation of an EIS or SEE.

If a licence/approval listed in s. 91 (l) of the EP&A Act is required, the project is considered to be *integrated development*. The government authorities responsible for granting these approvals are referred to as *integrated approval bodies* and may include EPA, NPWS, DLWC, RTA, Council, The Heritage Office and NSW Fisheries (see Appendix 5). Under integrated development provisions, a co-ordinated approach is taken by all approval authorities in the assessment and approval of the project.

Development consent from DLWC may also be required under the *Native Vegetation Conservation Act* if mature vegetation is being cleared.

EIA under Part 5 In some circumstances, components of a proposal may require development consent and fall under Part 4 of the Act, while other components may not require consent and fall under Part 5. In these circumstances, the provisions of both Part 4 and Part 5 apply.

The provisions of Part 5 of the EP&A Act apply when proposals do not require development consent, are not prohibited under the provisions of the local environmental plan and require an approval under NSW legislation.

Part 5 would not normally apply to wind farms but may apply to transmission lines connecting the facility to the grid. Under Part 5, prior to a *determining authority* granting an approval to carry out the project, they must consider whether the proposal has the potential to significantly affect the environment. If the determining authority considers significant impacts are likely, an EIS must be prepared and examined before an approval is granted. The guideline *Is an EIS required?* (Department of Planning) must be used to determine if an EIS is required.

Matters of National Environmental Significance Proposals that are likely to affect matters of *National Environmental Significance* (NES) as listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) must be referred to Environment Australia to determine if a Commonwealth approval is required. An action that needs Commonwealth approval is called a *controlled action*. An assessment report called a National Environmental Significance Assessment (NESA) must be prepared for all controlled actions.

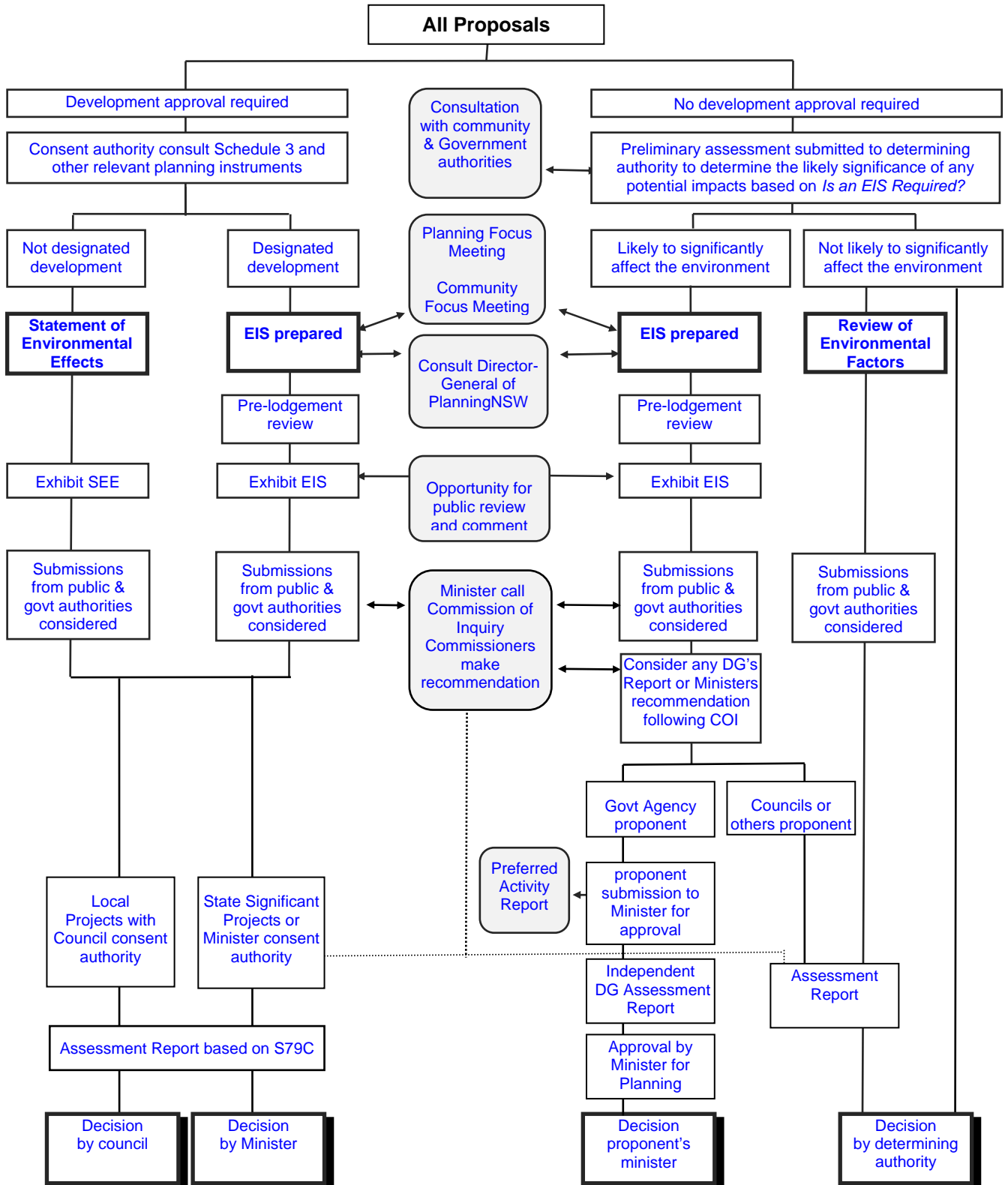
The Commonwealth assessment process parallels the NSW EIA process and can be carried out along with the NSW process.

Where the controlled action requires an EIS or SEE under the EP&A Act, the NESA could form part of that document. Environment Australia should be consulted regarding the contents of a NESA (see Appendix 4 for further information).

EIA PROCEDURES UNDER THE EP&A ACT

Approvals required under
Part 4

Approvals required under
Part 5



2. Factors to consider when undertaking EIA

Principles for undertaking EIA

- Early consideration of the strategic context and the principles of ESD
- Early consideration of environmental factors in the evaluation of options
- Identify and focus assessment on key issues for decision making
- Take a precautionary approach in predicting the level of impacts
- Outline an ongoing commitment to environmental management
- Build in quality control measures in the preparation of the EIA Report

The aim of environmental impact assessment (EIA) is to enable the approving authorities, the community, the local council, other government authorities and the proponent to properly consider the potential environmental consequences of a proposal. It is important to provide sufficient information for the approving authorities to make a decision on whether to approve a proposal and if so, under what conditions. In addition the environment assessment should provide the basis for the sustainable ongoing management of the project.

It is the proponent's responsibility to identify and address, as fully as possible, the environmental implications of a specific proposal when applying for an approval for a project. These include early consideration of the sustainability of the proposal and how well it fits within the strategic context.

2.1 Ecologically sustainable development

There is now a general provision to consider the sustainability of actions including the approval of projects, taken under the EP&A Act. In addition there is a specific requirement under the EP&A Regulation, where an EIS is being prepared, to justify undertaking a proposal having regard to biophysical, economic and social considerations and the principles of ecologically sustainable development (ESD). These principles are outlined in Appendix I and equally apply to projects requiring an SEE.

Sustainability requires a combination of good planning and an effective and environmentally sound approach to design, operation and management. The proponent should have regard to the principles of ESD throughout the whole project life cycle, and especially:

- when developing the objectives for the project
- during project formulation, planning and design
- when considering project options and alternatives
- during construction
- for the operational life of the proposal
- afterwards during decommissioning, site rehabilitation and reuse.

To assist proponents in addressing these issues, the Department of Planning has prepared *Guidelines for the consideration of Sustainability in EIA*. Important aspects of this ESD guideline have been included in the following sections to highlight issues of importance in the development of wind energy projects.

Figure 1. Project Formulation and Management, and Public Participation

PROJECT FORMULATION & MANAGEMENT	EIA & APPROVAL PROCESS	PUBLIC PARTICIPATION
Strategic Business Planning Identify needs/demands Project Objectives	Preliminary Environmental Assessment	Input into the identification of needs/demands and alternatives to meet those needs
Project siting alternatives Project Layout and Design Options Preparation of EIA Report Exhibition of EIA Report Organisation commitments to proceed with the project	Deciding if permissible; if EIS required or if meets minimum performance criteria Scoping issues to be addressed Assessment Decision-making	Input into issues associated with alternative sites and project layout and design options and issues to be addressed in the EIA Report Public evaluation of EIA Report Feedback on Justification for decision
Detail design and operation details Construction Phase Operational Phase	Construction & Operational EMPs Monitoring and Audit Verification and compliance	Community Consultation Committees Feedback on monitoring of construction and operations and resolution of complaints/conflicts
Decommissioning and Rehabilitation Phase	Rehabilitation Plan	Consultation on end use

2.2 Early consideration of the strategic context

The “need” for the proposal should be identified in the context of any broader demand management, greenhouse or sustainable energy strategies and goals. Consideration of this broader context is essential when identifying and selecting options for the proposal. In addition strategic policies and plans relating to land use, economic development, biodiversity and other environmental goals should be considered at this stage. Any relevant cumulative or strategic environmental studies should also be considered when formulating and justifying undertaking a proposal.

2.3 Early evaluation of options

The objectives for the proposal should be developed to meet any identified need. The ESD principles (see Appendix 1) should be considered when developing the objectives for the project as well as reviewing and updating organisational goals. It is recommended that an organisation undertake an assessment of its current and/or proposed operating practices including business planning, operational management, monitoring and reporting to determine how sustainability principles can be incorporated/updated and can assist in efficiently delivering an environmentally sound project. The development of these initiatives has an important role to play in the delivery of sustainable projects in NSW (Figure 1).

ESD principles must be considered in evaluating options at all stages of project development and operation from site selection, project design, project construction, the operational life of the project, staff training, the use

and disposal of the project products and post-project decommissioning and site rehabilitation. A thorough identification and assessment of all feasible alternatives should be considered in terms of achieving sustainability goals including non-structural solutions, demand management, resource and energy recovery and recycling, waste management, alternative resource and energy options and the do-nothing option. Alternatives which result in outcomes consistent with the principles of ESD should be favoured over other options.

All feasible alternatives that could satisfy the objectives of the proposal should be considered including the “do-nothing” option. When weighing up options, the biophysical, economic and social costs and benefits throughout the whole life cycle of the proposal should be considered.

Careful option selection can lower community concerns and reduce potential costs of mitigation and management required to control environmental (including social) impacts. Early adoption of ecologically sustainable strategies can reduce possible conflicts, and additional costs and delays at later stages of the approval process.

2.4 Identifying issues

If an EIS is required, the general framework for an EIS is prescribed in Schedule 2 of the EP&A Regulation (see Appendix 1). The Director-General of PlanningNSW must be consulted for requirements to be addressed in an EIS. These requirements are developed in consultation with other approval authorities and the relevant local councils. If an EIS is not required, the consent authority (council or the Minister) and any integrated approval authorities should be consulted for advice on any specific matters to be covered in a SEE.

In addition to the specific legal requirements, the proponent has a broader responsibility to consider all potential environmental issues in relation to the proposal.

A precautionary approach should be adopted when scoping issues. If insufficient information is available, a preliminary assessment of the site and project characteristics may need to be undertaken to identify important characteristics of:

- the project – eg in relation to resource and energy to be used, likely pollution emission and waste generation
- the site – eg the neighbours, the vegetation and habitat characteristics, the heritage significance, the drainage and soil characteristics, transport and services issues.

If the project characteristics or the site should change, then the potential impacts may also change. If at any time changes occur, the scoping process should be reviewed. If major changes occur, the Director-General or local council may need to be reconsulted to amend their requirements.

In addition to the issues outlined in this guideline, other sources of information which may assist in the identification of potential issues include:

- any relevant guidelines produced by other NSW government authorities, e.g. SEDA *Wind Energy Development Guide* (2002), NSW *Industrial Noise Policy* (EPA, 2000),
- EIA for similar projects, determination report and conditions of approval
- relevant guidance material or research eg. AusWEA Best Practice Guidelines for Implementation of Wind Energy Projects in Australia (2002) *Guidelines for Renewable Energy Developments –Wind Energy* (New Zealand Energy Efficiency and Conservation Authority 1995)
- information from organisations such as CSIRO, AusWEA and SEDA

There are a number of approaches or mechanisms that help identify potential environmental issues relating to a particular proposal in a particular location. They may involve informal consultation with key stakeholders or a structured process with a high level of consultation with all stakeholders. The choice of the approach should depend on the scale and type of proposal and the sensitivity of the environment and the affected community. These may include:

- consultation outlined in Section 3 of this guideline
- checklist, matrix, network, GIS or overlay methods or similar approaches such as in *Is an EIS required?* (Department of Planning).

2.5 Prioritising issues

Not all issues identified will have the same degree of relevance for all proposals. The relative importance placed on different issues will vary from case to case, and is a function of the type and size of the proposal and the sensitivity of the receiving environment. Issues should therefore be prioritised according to their importance in the decision-making process.

When prioritising issues, consideration should be given to the potential severity, temporal and spatial extent of any beneficial and adverse effects; their direct impacts as well as any indirect, secondary, tertiary or cumulative impacts; and whether the effects are continuous or intermittent, temporary and reversible or permanent and irreversible.

The outcome of the identification and prioritisation process should result in:

- a list of all issues with a preliminary estimate of the relative significance of their impacts
- identification of the key issues
- an explanation as to why other issues are not considered to be key.

The EIA process should focus on key issues of concern. The SEE or EIS should address the key issues as fully as practicable. The level of analysis of other issues should reflect the level of significance of the impacts and their importance for the proposal.

2.6 Impact prediction and analysis

The SEE/EIS should identify and predict the potential impacts of the project on the local environment including the community and resource use and to appropriate extent, the region and beyond. Discussion should include predictions of the nature and extent of potential impacts and the effectiveness of mitigation strategies. The assessment should consider the principles of ESD in the identification of impacts, the prediction of outcomes and in the design of management, mitigation and monitoring / reporting measures.

This information is fundamental to deciding the potential sustainability and hence the acceptability of a particular proposal. Continual reference should be made to the question 'Is this proposal ecologically sustainable?'

Baseline information

Where baseline data is to be collected first-hand, careful consideration must be given to the design of the sampling program. Matters include:

- the degree of understanding of the processes in question
- the reasons for the data collection
- sampling program design and timeframes
- data collection procedures
- data analysis methodologies
- relevant quality assurance procedures.

The need for long-term sampling to discern the variability of the environment should also be assessed as early as possible so that it is not overlooked or avoided due to time constraints. Assumptions and extrapolations used to draw conclusions from the data should be justified.

In some circumstances, there may be sufficient existing data available for assessment purposes without the need for additional sampling. Where existing data is used, its adequacy and appropriateness for impact assessment of the proposal should be reviewed and discussed, taking into consideration the above points for first-hand data collection. Shortfalls or uncertainty in knowledge should be clearly identified.

In all cases, sampling programs and analysis procedures should reflect current scientific approaches. Peer review of study design, sampling methodology, data analysis and interpretation of results may help identify inadequacies, without the cost implications if it is changed once sampling commences.

Cumulative issues The base line data can provide an insight into the cumulative impacts of past or current activities on a particular issue such as water or air quality, biodiversity or economic development. Particular attention should be given when predicting impacts to consideration of the assimilation capacity and the likely reaction of the environment of additional impacts as a result of the proposal. While a comprehensive cumulative impact study would predict the likely impact of all likely changes in the region, this is not feasible in a project assessment. The consideration of cumulative issues should be focused on the accumulated effects resulting from the direct or indirect impacts for the project and other projects directly associated or flowing from the proposal. The cumulative issues should be identified that would put at risk the sustainability of the project or would likely to result in costly mitigation measures to ensure sustainable outcomes

Predictions of impacts The project should be described in sufficient detail to identify and understand its likely impacts on the environment. These impacts should be predicted using best practice methodology whether qualitative or quantitative. Impact prediction should consider magnitude, duration, extent, direct and indirect effects, beneficial and adverse effects and whether impacts are reversible or permanent.

The activities or incidence likely to result in occasional impacts or occasional peaks of impacts should be identified. A risk-based approach should be taken in identifying the likelihood that the impacts will occur and the likely consequences.

All predictions of impacts and the likely success of mitigation strategies have an element of uncertainty associated with them. The proponent should identify and, where possible, indicate the level of uncertainty associated with these predictions and mitigation measures. This information is fundamental in developing appropriate management strategies and informs the proponent, community, government agencies and the decision- maker of the degree of risk associated with the proposal and the importance of that risk.

When predicting impacts, a clear distinction must be made between those impacts which can be assessed quantitatively and those for which only a qualitative assessment can be made. Predictive models used should be justified in terms of appropriateness for the task, outlining their strengths and weaknesses. Whenever conclusions and recommendations have been made based substantially on judgements instead of facts or objective

analytical results, the basis of the judgements should be clearly identified.

A precautionary approach should be adopted where there is a significant chance a proposal may lead to irreversible consequences.

Reference to standards or indicators Where possible, discussion of impact assessment and mitigation measures should make reference to recognised standards or indicators for sustainability and acceptable levels of impacts. For example, while EPA's *NSW Industrial Noise Policy* provides the general framework for consideration of noise impacts in NSW, the *New Zealand Wind Noise Standard NZS68081998* which suggests that the predicted sound level should not exceed the ambient level at residential sites by more than 5 dB(A) or an absolute level of 40 dB(A) (whichever is greater), provides another useful reference on acceptable noise levels.

2.7 Mitigation and ongoing management

A critical component in the EIA is the avoidance, minimisation or management of land use conflicts through the mitigation of impacts and commitments for ongoing sustainable management of the project. This component should demonstrate how the proposal and its environmental safeguards can be implemented and managed in an ecologically sustainable manner throughout the construction and operation of the project to ensure compliance with statutory obligations under all relevant licences or approvals.

The SEE or EIS should outline in one section, the proponent's ongoing commitments to environmental responsibility in the development and operation of the project.

Commitment to ongoing management This commitment should include

- a compilation of the applicants commitments with regard to the location, layout, design or technology features to minimise or manage impacts on the environment
- the environmental management principles which would be followed in the subsequent planning, design, construction and operation of the proposal
- an outline of an environmental management plan for the ongoing management and monitoring of the wind farm
- an outline of environmental monitoring programs, auditing and reporting program
- an outline of the ongoing community consultation program including complaints management
- conflict avoidance and resolution measures.

The mitigation strategy must consider individual impacts and collectively all impacts on the site as well as the broader area. This helps to ensure that mitigation strategies are efficiently integrated into a program with the potential for cost savings. In addition, it ensures that measures applied with respect to potential impacts do not increase the magnitude or significance of other likely impacts.

An environmental management plan (EMP) is a tool to ensure that the commitments in the EIS, subsequent assessment reports and approval or licence conditions are fully implemented. It provides the overall framework for specific environmental controls of a project. It is usually a comprehensive technical document that is finalised following approval of the project during or following detailed design of the proposal. This level of detail is not considered necessary for the SEE or EIS.

However the EMP should outline the issues to be managed, the general management approach, time frames, responsibilities and performance commitments. The intention of the EMP is to:

- encourage proponents to be systematic and explicit in implementing the environmental commitments made in the EIS or SEE
- ensure that the agreed mitigation measures are properly incorporated in the detailed design and contract obligations
- ensure predictions made in the EIS are monitored along with the environmental performance of key parameters
- ensure that mechanisms are in place to resolve potential problems associated with implementation of the project, and
- ensure greater transparency in the proponent and associated contractors meeting environmental requirements and responsibilities.

Mitigation strategies for the construction and operation stages of the project should be distinguished with separate construction and operational EMPs. With projects with potentially controversial environmental impacts, it may be appropriate to:

- consult with government authorities, council and the community when preparing the EMP
- establish a community consultation committee to provide ongoing communications regarding the management of the project.

2.8 Assessment checklist

Presentation Information provided should be clear, succinct, objective and where appropriate, supported by maps, figures, tables or other descriptive detail. Repetitive or non-specific general background information is distracting and is not relevant to the decision-making process. The use of jargon should be avoided. It is recommended that the EIA document be edited to ensure consistency of style and accuracy of transference of information from any appendices to the main document. Reference should be made to all relevant studies that have been carried out in support of the proposal and other studies, reports or literature on which the assessment relies. These should be made available during the public display of the proposal.

Quality control To ensure that an EIS document satisfactorily addresses the issues, the proponent should have a system of quality control in place. In this way proponents can ensure that their work is of an appropriate standard before it is subject to external review. As a minimum, the proponent should organise for a 'peer review' of the key issues in the draft EIS. This usually involves engaging an independent technical expert or experts (where necessary) to review the assessment of a particular key issue or issues.

In general the review criteria should include:

- meet legal EIA requirements
- comply with national and regional environmental target values, standards, guidelines or criteria about emission levels and environmental qualities directly related to the issue and the activity
- be consistent with appropriate technological and scientific methods
- address the acceptability of the conclusions regarding the significance of impacts, and
- ensure clarity of information for the use of technical and non-technical readers.

At the completion of the review the proponent should remedy any serious shortcomings which have been identified before the EIS is submitted to the consent authority for assessment.

Factors to be considered

- Have all potential impacts been identified? Has an appropriate level of assessment been undertaken to match the level of impacts? Are key impacts/risks quantifiable? Are impacts understood? Can a degree of certainty be associated with predictions? Where studies are referenced, has their applicability been determined? Has the assessment of key issues been subject to independent review?
- Have appropriate spatial and temporal scales been considered in the prediction of impact? What time-frame would be required for full recovery or assimilation of impacts? How acceptable are the timeframes in terms of conservation of cultural heritage, biodiversity and ecological integrity/ social equity considerations?
- Has the worst case scenario as well as occasional acute impacts (incidents, accidents, impacts during certain weather conditions) been considered? What are the likely occurrences of these impacts, their extent and severity? Should special mitigation provisions be developed?
- Have any risks and uncertainty been highlighted? Has the appropriate level of risk assessment been undertaken? Did it consider social (including health) as well as ecological implications? What are the long-term implications? Are they acceptable?
- Consider whether the impacts can meet the appropriate indicators, parameters or standards? Is the project proposing to use best available technology? Have possible mitigation measures and monitoring processes been identified? Have the implications of these mitigation measures been assessed? How successful are these expected to be? Is the proponent willing to pay a bond based on environmental performance? What compensation is to be made for unmitigatable impacts? Are offsets appropriate compensation?
- Have the cumulative impacts of this proposal and other existing development in the region been considered?

Reasonableness and adequacy

When considering matters, proponents are expected to apply the test of 'reasonableness' and "adequacy" given by the interpretation by the Court of Appeal that the obligation to consider environmental factors is only to the 'fullest extent reasonably practicable'. The NSW Land and Environment Court has also made a number of observations about the adequacy of EISs during its judgements (see Gilpin, 1995). The observations include:

- The purpose of an EIS is to bring matters to the attention of members of the public and the decision-maker so the environmental consequences of a proposal can be properly understood; The EIS is not a decision-making end in itself, but a means to a decision-making end
- The EIS must be sufficiently specific to direct a reasonably intelligent and informed mind to possible or potential environmental consequences
- The EIS should be written in understandable language
- The EIS should contain material which would alert both lay persons and specialists to potential problems
- An EIS would be unacceptable if it was superficial, subjective or non-informative

An EIS would be "reasonable and adequate" if it was objective in its approach and alerted relevant parties to the environmental effects and community consequences of carrying out or not carrying out the proposal. In applying these tests, consideration needs to be given to the characteristics of particular activity and the environmental constraints. There are industry-specific issues and the interpretation of what is 'reasonableness' may vary depending on the level of risk and the implications of the risks.

3. Consultation

Principles for consultation

- The level of consultation should be appropriate for the level of impacts or community concerns
- Consultation should include three aspects: providing information, gaining input and seeking resolution of issues
- Consultation should be included in all stages of the EIA process from the identification of needs to post approval activities
- Consultation methods should be appropriate for the scale and type of development and for the particular stage of the EIA process

3.1 Benefits from effective consultation

Consultation with the local community, industry, councils and government agencies throughout the EIA process can be of great assistance in making a preliminary assessment of the potential viability of a proposal at a particular site as well as ensuring that issues of concern are efficiently addressed as they arise. It can also assist in ensuring that the EIA focuses on those matters that will add value to the decision-making process.

Early and effective consultation should enable an applicant to:

- clarify the objectives for the proposal in terms of community needs and concerns, and the relationship of the proposal to any relevant strategic plans, government policy directions and statutory or planning constraints
- identify feasible alternatives (in particular alternative sites) and clarify their relative merits in terms of biophysical, social and economic factors
- identify environmental issues to:
 - prioritise the issues and identify those key to the decision-making
 - establish the scope of the studies for key issues so that there will be adequate information for the decision-making
 - where possible, identify performance objectives for key issues
 - when appropriate, identify experts (in government agencies or from other sources) who can assist in guiding the assessment of a key issue or peer review the assessment
 - identify processes for continued community involvement.

The following consultation procedures are recommended:

3.2 Consultation with government authorities

Consultation with councils and relevant government agencies is recommended to help identify alternatives and to provide a preliminary view on the acceptability of the project within the strategic context.

To maximise the benefits of consultation with government authorities, requests for advice should be accompanied by adequate information on the proposal itself as well as the proposed locations. The consultation requests should be targeted towards identifying key issues, and should relate specifically to the particulars of the location, design, anticipated impact and operation of the proposed facility.

Consultation with Local Councils

It is essential that the local council(s) responsible for the areas under consideration should be consulted early in the process to determine whether wind energy projects would be consistent with the general strategic planning trends for the area. In particular, it should be determined whether

wind energy projects could be compatible with the existing preferred land use for the area and whether the area has been identified for other purposes in the future such as urban expansion, conservation or mining or industrial uses which may be incompatible with wind energy proposals.

In addition, advice should be sought on whether wind energy is a permissible land use given the zoning currently applying to the areas under consideration. If it is not, advice should be sought as to whether council would be likely to change the zoning and the estimated timeframes to change the zoning to make wind farms permissible. In many circumstances, it may be possible to do a joint rezoning / development application.

Consultation required by legislation It is intended that this guideline should replace the need to undertake routine consultation with government agencies on general matters to be included in an EIS or SEE. However in some circumstances there are statutory requirements to consult.

Department of Planning If an EIS is required, a proponent must formally consult the Director-General of the Department of Planning regarding the content of an EIS. It is recommended that a Planning Focus Meeting (PFM) or preliminary discussions with council and other government agencies occur before the proponent consults the Director-General and that the minutes of the PFM or issues canvassed in the discussions be forwarded to the Department of Planning when the Director-General's requirements are requested.

NSW National Parks and Wildlife Service If a proposal is on land that contains a 'critical habitat' or threatened species, populations or ecological communities or their habitats, an 8 Part Test (section 5A of the EP&A Act) must be submitted to the consent authority to determine if there are likely to significantly affects and trigger the need for an Species Impact Statement (SIS). If a SIS is triggered, the Director-General of National Parks and Wildlife Service must be consulted regarding the contents of a SIS (see Appendix 3 for further information).

Any proposal likely to impact an Aboriginal place or object requires a heritage impact assessment. All impacts require the consent of the Director-General under s90 of the National Parks and Wildlife Act 1974.

Environment Australia Proposals that are likely to affect matters of "National Environmental Significance" (NES) as defined under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) must be referred to Environment Australia to determine if a Commonwealth approval is required. Where this is the case, the NES would form part of the EIS or SEE. Environment Australia should be consulted regarding the contents of a NES (see Appendix 4 for further information).

Integrated Development Authorities Integrated development is development that requires development consent and one or more of a number of approvals listed in s. 91 (1) of the EP&A Act. Consultation and close liaison with identified approval bodies (e.g. EPA, NPWS, DLWC, RTA, Heritage Office and NSW Fisheries) is recommended. (See Appendix 5 for further information).

Planning Focus Meetings To facilitate consultation with relevant government agencies prior to commencing the environmental assessment, it may be appropriate to hold a Planning Focus Meeting (PFM).

The Department recommends that PFMs be held for all major or potentially controversial proposals. The relevant council or the Department of Planning would usually be responsible for organising the PFM. In addition to including government authorities which have an approval role, other

agencies with expertise in the area, catchment management committees and independent technical experts may also need to be included depending on the location, site characteristics and management options.

For smaller projects, less formal meetings or discussions with relevant authorities, particularly the local council, should be undertaken. Issues such as whether a proposal is consistent with the council's strategic plan for the area and whether it is permissible at the particular site should be clarified at the outset.

For a wind energy proposal, the following organisations should be invited to a PFM or otherwise consulted:

- relevant local councils
- Department of Planning
- Environment Protection Authority
- Sustainable Energy Development Authority
- Ministry of Energy and Utilities
- NSW Agriculture
- relevant infrastructure providers likely to be affected – transmission line operators, pipeline operators, CASA and local pilots associations (if in the vicinity of an airport)

Appendix 5 lists other organisations that may need to be consulted to identify key issues for particular proposals.

3.3 Consultation with the community

The community likely to be affected, whether directly or indirectly, should be informed of the proposal and consulted early in the EIA process. Consultation should aim to include those directly affected and those likely to have an interest in the project.

Who to consult In identifying the appropriate people and organisations to consult, the following should be considered:

- which land owners of properties are being targeted for use
- what neighbours will be affected: eg next door, those along the transport route, those in the visual /noise catchment
- who represents those with local or regional interests or likely to be beneficially and/or adversely affected: eg council(s), indigenous organisations (local land councils, Native Title claimants, elders groups); business and tourist organisations; community organisations (environmental groups, heritage organisations, school committees, community service organisations); infrastructure authorities; water, catchment, biodiversity or vegetation committees
- who represents those with a State, National or global interest: eg Australian Greenhouse Office, SEDA, Premier's Department, peak environmental groups, national industry associations (eg AusWEA)

Consultation programs should ensure that the values of the certain sectors of the community such as the Indigenous community or those where language may be a barrier to participation are given appropriate representation. This may mean that the views of these stakeholders must be actively sought instead of waiting for them to come forward with the relevant information. This is particularly important when consulting on indigenous heritage issues.

Consultation with prospective landowners

Unlike many other developments, wind farms are usually located on one or more properties not owned by the proponent through lease arrangements. The landowner in most cases will be able to continue to operate the property as previously around the wind energy facilities.

Landowners may be the Crown (usually represented by DLWC for State owned lands) or the private sector. Consultation should commence early to determine the likelihood of an agreement to operate a wind farm on the property in the long term, and in the shorter term to gain access to undertake any wind monitoring or other site evaluation as part of a feasibility study. These negotiations may need to include an agreement with neighbouring properties if they are likely to be disturbed by noise or site access during construction. Landowners consent is required at the time of lodging a development applications.

Community Consultation Program

For major or controversial projects, a program of community consultation may need to be developed and undertaken as part of the preparation of the EIS or SEE.

It may be appropriate to engage professional community consultation experts to assist in this process. However, it is critical that key proponent representatives are active participants in the community consultation program, both in terms of their ability to resolve issues on behalf of the organisation and for the building of trust important in the ongoing community relationships.

At the pre-approval phase

At the pre-approval phase, the program would usually include at least three phases:

- firstly, informing the community the general parameters of what is proposed (eg, public displays, press statements, newsletters and on some occasions, public meetings). As part of this process, the stakeholders likely to be affected by the proposal or who may have an interest, should be identified and contacted
- secondly, gaining the community's input on issues of concern, to identify community values and to provide opportunities for their comments and views on alternatives (eg, community focus meetings, 'issues' workshops and community surveys/interviews)
- a third phase of negotiation and issues resolution where the proponent works directly with the community stakeholders as individuals or groups to address or resolve issues of concern (eg, community focus meetings, issues workshops, mediation sessions).

More suggestions for facilitating effective consultation include:

- Liaise with the councils in the area of the proposed site(s) to identify potential neighbours, local community groups, schools, industry associations, indigenous communities and other stakeholders that could have an interest in the project. NPWS can also provide information on contact details for indigenous communities and DSRD on industry associations.
- Advertise in local newspapers, the local library and/or the council chambers the intention to hold a workshop, information day or establish an exhibition/drop-in centre to seek views on potential project. These allow for discussion on an individual or small group basis. Large public meetings tend to be an inefficient method of effective communication and should normally be avoided.
- Provide the community with an outline of the project objectives, and the range of feasible alternatives. Ensure that any information provided to

the community emphasises that the project is in the conceptual stages, and that community views can help to shape outcomes.

- Prompt individuals and community groups to identify issues and values with respect to project alternatives (consider the use of surveys or checklists to draw out information).
- Follow up the issues discussed. Provide feedback on how the community views on alternatives were considered, with explanations on issues that have not been acted upon. Consider establishing a community information hot line phone number, producing a newsletter and/or establish an internet site to keep the community informed of progress.
- Once a site has been selected, follow up with more focused workshops or discussions on project design, construction and operational aspects and options. Ensure potential neighbours are kept in the loop.
- Follow up the issues discussed. Provide feedback on how the community views on alternatives were considered, with explanations on issues that have not been acted upon.
- During the exhibition period, make available the technical experts who prepared the EIS or SEE, to discuss technical issues with the community and explain the implications.
- If outstanding issues are raised in submissions, prior to a decision being made, suggest meeting with the parties (along with the consent authority and relevant government agencies) to resolve or mitigate the issues to minimise any potential conflicts.

At the post-approval phases

In many circumstances, it will be important to maintain the relationships with key individuals and organisations established during the pre-approval phase. The following should be considered during the post approval construction and/or operation phase of the project.

- Establish a Community Communications Program. The scope of the program will depend on the provisions in the development consent, the level and complexity of environmental impacts and/or the level of community concern.
- Components may include:
 - Community Consultation Committee to overview the implementation of the development consent including monitoring information as a feedback mechanism for the broader community.
 - Complaint management protocols including hot lines, response times, guarantees and reporting responsibilities to ensure that complaints are promptly attended to and the complainant is advised of the outcome.
 - Conflict resolution protocols including the use of third parties as necessary to assist in resolving any outstanding issues.
 - Communications: eg an internet site, newsletter, drop in information centre or notice board in the local community particularly during the construction and early operational phase to provide up to date information on the progression of construction and operation, hold open days from time to time for the community to be kept up to date on the operation of the project.

4. Site selection procedures

Principles of site selection

Consideration must be given to whether:

- the land use is permissible
- environmentally sensitive areas are avoided
- the use is compatible with nearby land uses
- initial site investigations indicate the site is fundamentally suitable for a wind energy proposal.

4.1 Importance of a rigorous site selection process

Operational factors such as the reliability of winds, the demand for power, proximity of appropriate voltage transmission lines and access are key operational factors in the successful siting of a wind farm. However the environmental and social characteristics of the area also needs careful consideration. The greater the potential for adverse effects on the environment or the community, the more important are these factors in the site selection process.

Benefits of site evaluation process

Appropriate site selection studies can avoid or reduce many of the environmental problems with wind farm proposals and:

- avoid potential delays in the approval process
- result in substantial savings in establishment and operational costs
- reduce levels of public concern.

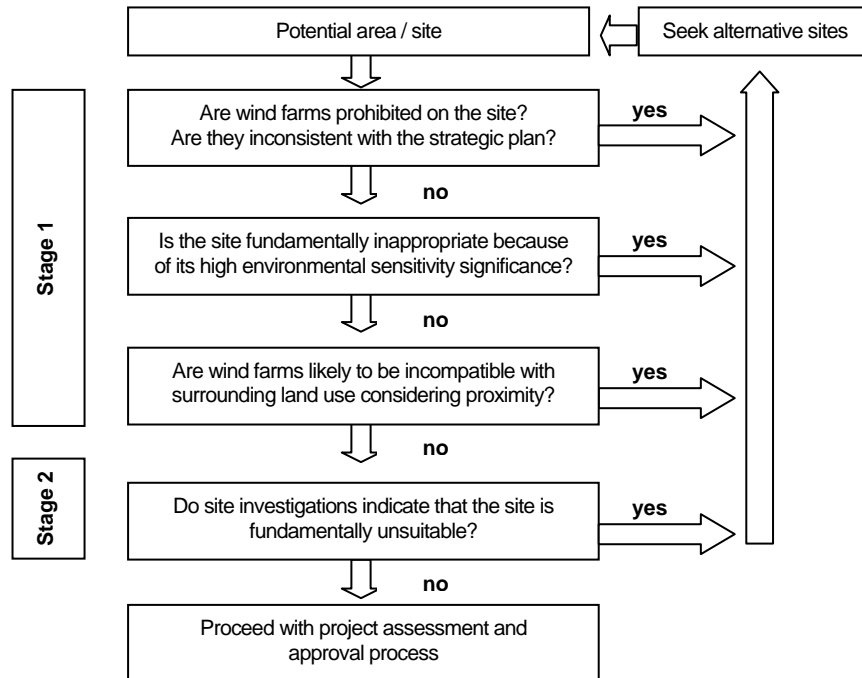
An iterative process

The site selection should be undertaken in two stages. A preliminary evaluation (often done as a desk-top study) can be used to eliminate unsuitable areas or sites based on broad criteria. This should be followed by a more detailed site evaluation based on site specific information. When selecting potentially feasible options, environmental, social, economic and land use constraints and opportunities must be considered along with operational, financial and engineering factors.

The option evaluation should be a staged iterative process with the number of options reduced or refined at each level of decision making. An increasing level of detail may be required to assist in eliminating options in relation to key environmental, operational, engineering, financial and strategic planning issues. The level of detail required should be commensurate with the scale of the proposal, the potential environmental risks associated with the proposal and the potential sensitivity of the location. All site selection studies should also involve an appropriate level of consultation with the government and community.

The site evaluation process should be objective, transparent and avoid unsupported or unsubstantiated opinions biased towards a predetermined option. Techniques such as multi-criteria analysis, weighted factor analysis or comparisons against pre-determined performance criteria/measures can be helpful in this process. The option analysis process can be greatly strengthened when independent technical experts in key environmental areas are consulted and their inputs are considered.

Figure 1. Site evaluation



Potential mitigation measures should be considered

At this stage the likely effectiveness and cost of mitigation measures to deal with any identified potential issues should be considered. For instance, while site A may seem preferable to site B based on the level of the impacts, when the costs, effectiveness and certainty of mitigation strategies are considered the preference could be reversed.

The potential availability of impact mitigation measures alone to alleviate serious environmental deficiencies should not be used to conclude that a location is suitable. Before proceeding with these types of sites, the views of relevant government authorities and the community should be sought regarding the:

- nature of the environmental constraint and its significance for the proposal's likely impacts
- availability and predictability of impact mitigation measures
- comparative merits of alternative sites.

Report results of site evaluation in EIS/SEE

The results of the selection process, along with the reasons for eliminating options, should be publicly available and reported in the EIS/SEE. A balanced judgement should be made taking account of all environmental factors. If a site is deemed to be suitable, the EIA document should include an outline of the site selection process including the results of the investigations and consultation process. The selection of the preferred option should be clearly justified on the basis of environmental, social and economic goals with an overarching consideration of the principles of ecologically sustainable development.

4.2 Stage 1 Preliminary site evaluation

The first stage of the selection study can be extremely cost-effective in excluding fundamentally unsuitable sites from further consideration. Some form of desktop study involving constraints mapping can assist in identifying general areas which are likely to be suitable and then narrowing down those areas into a limited number of sites for further investigations. This approach allows locations with major cost constraints, serious environmental issues or which are likely to result in major community conflicts to be identified and eliminated as early as possible.

When undertaking constraints mapping, it is important that an appropriate scale depending on the issue and the available information be used. As a general guide, a scale of 1:25 000 will normally be considered as a minimum for non-urban areas whilst 1:10 000 or larger is likely to be more appropriate for urban areas. Aerial photography, GIS, topographic maps and LEP zoning maps are extremely valuable tools in evaluating alternative sites. In addition, in areas where biodiversity or vegetation mapping has been undertaken, these maps and related information should be considered.

Permissibility of land use

At an early stage in the site selection process it is essential to check with the local council to determine where wind farms are permissible under the provisions of the LEP or other planning instruments. If wind farms are not permissible in an area proposed, discussions should be held with Council and / or the Department of Planning to determine the likelihood of having the site rezoned.

Environmentally sensitive areas

Areas of high environmental value should be identified and wherever possible, excluded from any further consideration as site selection options. Examples of areas of high environmental sensitivity include areas of significant environmental or conservation value identified under relevant legislation or environmental planning instruments such as:

- lands protected under the *National Parks and Wildlife Act 1974* including national parks; reserves and other areas covered by a Conservation Agreement or Aboriginal place declaration
- world heritage areas, other historic/heritage areas, buildings or sites
- wilderness areas identified or declared under the *Wilderness Act, 1987*
- areas of National environmental significance as specified under the Environment Protection and Biodiversity Conservation Act 1999
- SEPP 14 – Coastal Wetlands, SEPP 26 – Littoral Rainforests, SEPP 44 – Koala Habitat'
- areas zoned under a LEP or REP for environmental protection purposes, eg high scenic, scientific, cultural, wetlands, natural heritage.

Compatibility with surrounding land uses

Another important consideration is the compatibility of the proposal with existing or proposed surrounding land uses. Conflicts commonly arise when there is a perception that community's amenity will be affected for example by increased noise or loss or change in the landscape values.

Any potential conflicts and possible options for reducing or preventing conflicts during the site selection process should be considered. The principles of "prudent avoidance" of adverse impacts should be applied during the options evaluation phase. As such it would be preferable if wind farms could be sited away from towns and villages, major roads, airport facilities and the habitat of migratory birds and bats. Agricultural areas where crop dusting is practiced should also be avoided. In particular the acceptability of towers protruding above prominent ridgelines requires careful examination.

In some circumstances, increasing the separation distances from sensitive land uses can reduce potential conflict. Consideration may need to be given to entering into agreements not only with the landowner on whose property the facility is to be located but also with the affected neighbours.

In addition to considering current land use patterns, likely future use as identified in any council or agency strategic plan for the area should be considered. These plans should be checked to determine the risks of the likely future preferred land use that may not be compatible with wind farms eg if the area has been identified for future urban development, conservation or for mining or other purposes.

4.3 Stage 2 Preliminary site evaluation

The Stage 1 investigations can help provide confidence about including or excluding a potential area or site into a list of potentially feasible sites. At Stage 2, more site specific studies will need to be undertaken to help demonstrate whether a site is fundamentally suitable for a wind farm proposal prior to final selection of the preferred site and proceeding with a more detailed assessment.

In order to further eliminate alternatives and to select a cost-effective option that minimises the environmental costs and maximises the benefits, further information will be required on both the proposal as well as the environment. In addition to the environmental studies, input from consultation with the community should be included in the analysis and option selection process. The option selection study should provide a comparative evaluation of potentially feasible options including the likely costs and effectiveness of mitigation measures. Examples of factors which may need to be considered in the initial site assessment are listed in Table 2.

Project information required at this stage

At this stage, additional information will be required on the proposal parameters such as the likely number and height of towers and scenarios regarding their placement within the site or area. Information on the proposed connection route to energy user or/and transmission lines is also needed. The area of land required to provide adequate separation distance between towers should be identified, and whether it is preferable to cluster the towers in particular formations based on engineering or operational criteria. In some cases, three dimensional models may aid in the definition of proposal options to enable an adequate comparison in terms of engineering, financial and environmental factors. In addition, information of the likely size of the turbine and tower components, their source and the likely access route to the site should be identified along with any likely constraints.

Environmental factors needed at this stage

Temporary anemometer masts will usually need to be erected at the proposed site to confirm appropriate wind conditions. In addition, limited environmental field studies such as preliminary heritage, fauna, flora, soils/geology, surrounding landuse and visual landscape studies, as well as social surveys or studies will be required.

Community consultation at this stage

A parallel task involves community consultation to assess values, needs, concerns and preferences. Involvement of the community should be as broad as possible and should not be limited to specific interests or targeted at specific individuals. Care should be taken to ensure that any affected disadvantaged groups are given an opportunity to comment. A commitment to preferred options should not be made until community feedback has been considered in the analysis.

Table 2 Matters to be considered in initial site investigations

Operational Requirements	<ul style="list-style-type: none"> ▪ Has adequate wind monitoring be undertaken in the area/site on which to base a decision regarding the adequacy of the wind? Does the wind monitoring shown that the site has appropriate wind conditions? ▪ Is connection to the electricity grid or to the proposed energy users technically and commercially feasible? Are there feasible corridors for any connections required? ▪ Is the proposal likely to exceed the capacity of the transmission grid requiring upgrading of the system or components of the system? Will the costs of any augmentation to the transmission grid (eg substation upgrades etc) justified in terms of benefits? ▪ Does the site or nearby areas provide opportunities for future expansion? ▪ Are the topographic characteristics likely to result in design or construction difficulties? ▪ Is access to the site technically, practically and commercially feasible?
Infrastructure Issues	<ul style="list-style-type: none"> ▪ Is the proposal likely to result in electromagnetic interference – eg TV microwave radar, radio transmission, mobile phone? ▪ Is the site compatible with local aircraft operations e.g. local airport and crop dusting activities? ▪ Is the site located with adequate roads for construction vehicles (especially wide loads)? ▪ Is there likely to be a problem with shadow flicker or reflected light from the rotor blades because of the proximity to major highways?
Community Issues	<ul style="list-style-type: none"> ▪ Will the proposal adversely affect the existing land uses on the site including the gathering of natural resources by Aboriginal people for traditional purposes? ▪ Will the proposal adversely affect neighbouring land uses? ▪ Is the proposal consistent with the Councils strategic planning for the area? ▪ Is the proposal likely to adversely affect any sites of outstanding natural environmental, cultural, landscape (visual), agricultural or mineral value? ▪ Is the site located so that the project could become a tourism asset for the region?
Noise issues	<ul style="list-style-type: none"> ▪ Is there any existing noise issues in the area given nearby land uses and the topography? ▪ Are surrounding land uses likely to be sensitive to the potential noise impact?
Landscape and visual issues	<ul style="list-style-type: none"> ▪ Is the site highly visible from key vantage points eg major highways, towns? ▪ Would the towers protrude beyond the ridge line? ▪ Is the site in an area of high visual landscape significance?
Flora and fauna issues	<ul style="list-style-type: none"> ▪ Have threatened birds or bats species or populations been recorded on the site? Will a SIS be required? Will a Commonwealth approval be required? ▪ Is the site near a wetland or waterbody frequented by migratory birds? ▪ Is the site near key bat or bird roosting/feeding areas or on a recognised flight path of bats or birds? ▪ Can clearing of native vegetation or vegetation of high significance be avoided?
Heritage issues	<ul style="list-style-type: none"> ▪ Is the proposal likely to affect the heritage significance of any Aboriginal or non-Aboriginal heritage items found or likely to be found on the site? ▪ Is the proposal likely to affect areas with natural heritage value?
Geological and soil issues	<ul style="list-style-type: none"> ▪ Are there any geological or soils characteristics which may affect engineering issues or cause difficulties in managing impacts (subsidence, slippage, contaminated soils, acid sulfate soils)? ▪ Are there likely to be sediment management issues during construction or the ongoing access management given the soil and slope characteristics?
Cumulative issues	<ul style="list-style-type: none"> ▪ Is the proposal likely to contribute to any existing cumulative problems (eg visual, noise etc)?

5. Summary of EIS requirements

Summary of requirements

A summary of the specific requirements for an EIS or SEE for a wind energy proposal are provided in the box on the right. These requirements are discussed in detail in Part 6. All issues nominated will not have the same degree of relevance for all proposals. Depending on the characteristics of the proposal, some of the requirements may be more relevant than others, while others will not be applicable at all. The EIA document should be tailored to the specific proposal and should focus on the key issues. The statutory requirements for an EIS are prescribed in Schedule 2 of the EP&A Regulation (refer to Appendix 1).

A. Executive Summary

B. The Proposal

1. Objectives of the proposal
2. Description of proposed wind farm
3. Site layout plans
4. Construction plans.
5. Construction issues
6. Consideration of alternatives and justification for the preferred option

C. The Location

1. Planning context
2. Site description and locality information
3. Overview of the affected environment

D. Identification and prioritisation of issue

1. Overview of the methodology
2. Outcomes of the process

E. The Environmental Issues

1. Greenhouse and energy issues
2. Landscape and visual issues
3. Noise issues
4. Air quality issues
5. Soil, drainage and geological issues
6. Flora and fauna issues
7. Heritage issues
8. Infrastructure and utilities issues
9. Social issues
10. Economic issues
11. Cumulative issues

F. Compilation of mitigation measures

1. Approvals and Licences
2. Outline of performance commitments and the environmental management principles
3. Outline of Environmental Management Plan (EMP)
4. Outline of Monitoring Program
5. Outline of Community Consultation Program
6. Land use conflict avoidance strategy

G. Justification for the proposal

6. Specific requirements for an EIS

A. EXECUTIVE SUMMARY

An executive summary should be provided and should be available separately for public information. The summary should give a short overview of the proposal and the potential environmental impacts, and should include a clear map or aerial photograph of the location. It should be written in non-technical language to facilitate understanding of the proposal by the general public.

B. THE PROPOSAL

1. Objectives of the proposal

The need for the proposal should be clearly stated and justified in terms of ecological sustainability and the strategic context. Project objectives to meet these need should consider the following issues:

- (a) the role of the proposal in assisting electricity retailers to meet:
 - (i) demand for renewable energy to meet demand for green power
 - (ii) Mandatory Renewable Energy Target
 - (iii) emissions benchmarks (eg in greenhouse gas abatement plans)
- (b) the role of the proposal in any relevant land use or strategic plan including:
 - (i) any local or regional electricity generating needs
 - (ii) the preferred land use in the area and likely future trends
- (c) the anticipated level of performance in meeting environmental objectives and the principles of ESD

2. Consideration of alternatives and justification for the preferred option

Alternatives that could satisfy the objectives of the proposal should be examined to ensure that the best solution has been identified. Consider the environmental impacts or consequences of adopting alternatives including as applicable:

- (a) alternative locations
- (b) alternative proposal options such as alternative size, capacity, design standards or layout of towers
- (c) alternative construction options including off-site or on-site fabrication of towers or assembly of turbine components
- (d) alternative environmental management options including maintenance regimes, landscaping, risk management options and site rehabilitation, and end use options of decommissioned sites
- (e) alternatives for financing the proposal including private sector participation
- (f) the do-nothing (no-build) option - the consequences of not proceeding with the proposal or any alternatives must be considered.

Some of the issues which may need to be considered in the analysis and justification for the selection of a preferred option are the:

- (a) ability to satisfy the objectives of the proposal
- (b) efficiency in meeting present needs and flexibility to meet future demand
- (c) reliability to meet acceptable environmental standards
- (d) the acceptability of any environmental risks or uncertainties
- (e) ability to handle abnormal events such as fires or hurricanes
- (f) efficient use of land and other resources
- (g) the relative acceptability of environmental impacts including biophysical,

economic and social costs and benefits of each alternative - significant non-monetary and non-quantifiable costs and benefits should be described and qualitatively assessed.

3. Description of the proposal

The description of the wind farm proposal should be provided in sufficient detail so all the impacts can be identified and assessed. In describing the proposal, outline how the project layout and design has been configured to meet the principles of ESD. Outline:

- (a) proposed generation capacity of the wind farm
- (b) the proposed market for the energy and any relationship with any electricity generator, network operator or retailer or any energy users
- (c) height, capacity, materials and design of turbines and towers - size, design features and standards of all other components of the proposal
- (d) the transmission connection on the site and to the grid/energy users – capacity, length, route, any easement issues
- (e) estimated project costs including transmission infrastructure and access roads
- (f) outline land ownership or lease arrangements (if leasehold indicate the number of landowners and length of lease)
- (g) the proposed operational, management and maintenance regime
- (h) the number of employees on site and in any support capacity off-site.
- (i) possible future expansion or future stages

4. Site layout

Provide plans, sketches, diagrams, maps, aerial photographs or photomontages indicating the location of the following:

- (a) any land proposed as wind farm sites and associated construction indicate:
 - (i) the current land use and identify all residences
 - (ii) any significant vegetation communities, waterbodies, buildings or features
 - (iii) existing transmissions lines, pipelines, roads or crown easements
- (b) proposed lay-out, pattern and spacing of turbines; administration buildings access roads, any tourist facilities/viewing facilities, landscaping, any noise and visual bunding
- (c) existing and proposed transmission lines connection on the site and to the grid (including easements) and substations.
- (d) construction area including access roads, construction camps, fabrication or assembly areas, any on-site concrete batching facilities; stores for fuels and any dangerous goods, storage areas for soil and construction materials, drainage protection and sediment control works. and rehabilitation works
- (e) possible future expansion area.

5. Construction issues

Outline the construction activities that relate to site establishment, construction or post construction rehabilitation, such as:

- (a) the construction program and any staging
- (b) the construction period and daily hours
- (c) the total number of construction employees, or numbers at each stage or construction location
- (d) proposed sources and volumes of construction materials, chemicals, fuels and other materials to be transported to the site
- (e) proposed truck routes and outline
 - (i) method of transporting large items to site
 - (ii) any upgrade works required on the access routes to allow for

- transport of large items
- (iii) road safety protocols for the transport of large items
- (f) details of site establishment works, such as:
 - (i) relocation and adjustment of utilities and services; any diversion of drainage lines or watercourses
 - (ii) the establishment of site offices, construction compounds, stockpiles of materials, the erection of temporary fencing, lighting and signage
 - (iii) any land clearing or demolition of unwanted buildings and structures; the removal of overburden; stockpiling and stabilisation of soil for later use; waste management activities (including reuse or disposal such as chipping of removed vegetation and management of any contaminated soil).
- (g) Provide details of construction works such as:
 - (i) temporary and permanent erosion and sediment control structures
 - (ii) upgrading of existing tracks or construction of new tracks
 - (iii) construction of underground and above ground transmission lines and connection to the grid
 - (iv) tower fabrication and/or assembly and erection
 - (v) turbine assembly and erection
 - (vi) construction of buildings, service and maintenance facilities.
- (h) Provide details of landscaping, site rehabilitation and end use such as:
 - (i) outline any landscaping along sight lines or adjacent buildings
 - (ii) outline rehabilitation plans for construction areas, showing final contours and drainage for the site and the staging of the rehabilitation and landscaping
- (i) Provide details of waste management and disposal, such as:
 - (i) volumes and types of surplus fill and demolition material; proposed transport arrangements; disposal methods and sites; recycling opportunities and stockpile requirements
 - (ii) the management strategy for any contaminated spoil or materials.

C. THE LOCATION

1. Planning context, site description and locality information

The following information should be provided:

- (a) local government area boundaries, zoning, permissibility
- (b) land tenure and title details; where Crown land is involved, any constraint associated with the form of lease or tenure, where appropriate, the Native Title status of the land and the procedures to be followed to satisfy the requirements of the Commonwealth's *Native Title Act(1993)*
- (c) a site description including topographic maps, plans or aerial photographs clearly identifying the location of the proposal relative to surrounding urban or non-urban communities and land uses, important natural features, transport networks, utilities and services; sight- lines from dwellings or public places, location of any existing or proposed equipment (anemometer masts, transmission facilities etc).
- (d) the provisions of any relevant strategic plan by council(s) or government authorities applying to the site or area (land use, economic development, vegetation, biodiversity, electricity distribution, etc)

2. Overview of the receiving environment

An overview of the environment should be provided in order to place the proposal in its local and regional context. The description may be general, as specific details will be provided when assessing the environmental impacts of the proposal. General information to be provided includes an overview of:

- (a) meteorological characteristics which may influence the viability of the project - wind intensity, direction, reliability and variability as well as characteristics which could affect environmental issues such as rainfall intensity, frequency and seasonal distribution
- (b) the geomorphological factors such as major landform features and slope gradients
- (c) general soil characteristics which could affect construction eg any potential for erosion or acid sulfate soils problems
- (d) the location of any natural or artificial waterbodies including wetlands likely to attract birds
- (e) predominant vegetation communities in areas surrounding the wind farm sites, their potential habitat and conservation values
- (f) scenic or visual significance of the landscape
- (g) the heritage, conservation, historical, cultural, or scientific significance of any buildings, items, places, landforms, flora, fauna or areas likely to be affected by the proposal.
- (h) landuse adjacent or nearby to the proposed sites including infrastructure and public utilities (airports, roads, pipelines, telecommunications, transmission lines etc); outline trends in land use in the area (eg extensive farming transitioning to small lots etc)

D. IDENTIFICATION AND PRIORITISATION OF ISSUES

1. Overview of the methodology

- Outline the procedures or methodology used to identify and prioritise issues. Factors to consider may include:
- (a) an outcome of a review of relevant sources of information on potential issues including:
 - (i) any relevant guidelines produced by NSW government authorities, other relevant State, Federal or overseas guidelines
 - (ii) other projects particularly if operating in similar locations; EIA documents for similar projects, any relevant commission of inquiry reports, determination reports and conditions of approval
 - (iii) relevant research and reference material on wind farms
 - (iv) relevant strategic plans or policies (greenhouse, electricity generation or networks, native vegetation management plans, REPs, LEPs, PEPs)
 - (v) relevant preliminary studies or pre-feasibility studies
 - (b) an outcome of consultation with stakeholders including
 - (i) planning focus meetings, community focus meetings, community workshops or Issues groups
 - (ii) meetings with stakeholders (e.g. government agencies, particularly DoP, EPA, councils, major land developers or electricity users)
 - (c) the use of methodology to prioritise issues such as *Is an EIS required?* (Department of Planning) or checklists or similar approaches.

2. Outcomes of the process

- Summarise the outcome of the identification and prioritisation process including outline:
- (a) all the issues identified
 - (b) the key issues which will need a full analysis (including comprehensive baseline information)
 - (c) the issues which will not need a full analysis, though they may be addressed in the mitigation strategy
 - (d) the justification for the proposed level of analysis.

E. ENVIRONMENTAL ISSUES

The following list of specific issues is not exhaustive and the degree of relevance of each will vary from proposal to proposal. The focus should be on key environmental issues. **With each issue, the level of detail should match the level of importance of the issue to decision-making.**

The following should be included in the assessment of relevant issue:

- a description of the existing environment (baseline conditions)
- a prediction of the potential impacts on the environment and an analysis of the likely significance of the impacts; the analysis should indicate the level of confidence in the predicted outcomes and the resilience of the environment to cope with the impacts
- the proposed mitigation, management and monitoring program, including the level of confidence that the measures will effectively mitigate or manage the impacts.

1. Greenhouse and Energy Issues

The following should be considered:

- (a) outline policies or programs which provide incentives in support of wind energy; estimate the greenhouse emissions per MWhr; compare these emissions with coal, gas and other forms of “green” energy.
- (b) if relevant, consider the implications and opportunities of guaranteeing energy supply during periods of low or no winds eg energy storage or standby generation provisions
- (c) Construction issues:
 - (i) outline the potential sources of greenhouse gas emissions including vegetation clearance, waste, disturbance to the soil surface and transportation and estimate the greenhouse gas emissions arising from the construction of the proposal
 - (ii) identify all opportunities to minimise greenhouse gas emissions and increase energy efficiency in generation and use
 - energy efficiency – in selection of technology, design, layout and construction techniques
 - materials selection – procurement of goods that minimise energy use and greenhouse gas emissions by lifetime energy consumption and embodied energy.
 - minimisation of vegetation and soil disturbance
 - waste minimisation in the construction.
 - transport including a comparison of the greenhouse gas emissions arising from alternative transport routes, alternative transport modes and fabrication on-site compared to fabrication off-site.
- (d) Operational issues:
 - (i) estimate energy expenditure during the operation and maintenance of the wind farm and associated infrastructure,
 - (ii) identify all opportunities to minimise greenhouse gas emissions and maximise energy efficiency of the wind farm
- (e) outline how the measure to minimise energy use and greenhouse emissions during construction and operation of the proposal will be implemented through the environmental management plan.

2. Landscape and visual issues

Issues which may need to be considered include:

- (a) describe the existing landscape setting and the key features contributing to its character including its heritage values. Identify the likely risk that the landscape setting or surrounding land use will change in the short, mid or longer term.
- (b) identify the visual catchment(s) of the wind farm or any associated infrastructure:
 - (i) consider the visual quality and significance of the landscape including unique visual aspects and the extent of any existing visual degradation
 - (ii) identify areas (in particular public area) with the high visual impacts from the fore, middle and background
 - (iii) consider the visual absorption capacity of the area (particularly if towers protrude beyond the ridge line) including the compatibility of the proposal with the existing visual environment and scale of the proposal relative to existing land uses;
 - (iv) outline the community's views on whether the project is likely to become a visual asset or liability to the landscape quality of the area. In this context, consider the impacts on the landscapes quality or particular features of local or regional significance or sensitivity from key vantage points
- (c) identify the potential for reflective light and shadow flicker from the blades of the wind turbine/s at residences, road or other public places outline any risks to road safety, and evaluate their significance
- (d) outline measures to mitigate visual impacts including:
 - (i) location, layout, surface treatment and colour of structures
 - (ii) any landscaping and the rehabilitation of constructions areas
 - (iii) ongoing community consultation measures
- (e) discuss the acceptability of impacts and the adequacy of the mitigation strategies to manage visual impacts.
- (f) consider the risks associated with managing visual impacts if the surrounding land use changes; can contingencies be built into the project if the risk are high.

3. Noise issues

Issues to consider include:

- (a) describe the existing acoustic environments including the meteorological conditions, topographical features and distances to residences which will influence noise impacts, and the likely risk that the surrounding land use will change in the short, mid or longer term.
- (b) construction noise:
 - (i) identify potential fixed and mobile noise sources during construction including truck transport and heavy vehicle movement: identify activities likely to generate maximum noise impacts because of level and tonal quality
 - (ii) predict noise levels at potentially affected dwellings
 - (iii) outline mitigation and management measures to minimise the generation of noise and to ensure compliance with relevant noise requirements including measures to minimise and manage "peak noisy" activities (eg when, extent, nature etc)
 - (iv) assess the ability to meet appropriate noise and vibration levels such as the *NSW Industrial Noise Policy* (EPA, 2000) and *NSW Road Traffic Noise Policy*
- (c) operational noise
 - (i) identify potential fixed and mobile noise sources: identify circumstances likely to generate maximum noise impacts because of level and tonal quality

- (ii) predict the wind turbine noise levels during operation at source and at the boundary, the nearest residences and key vantage areas.
 - (iii) assess the ability of the project to meet appropriate noise and vibration levels at the boundary of the site and at the nearest affected residences/sensitive receptor.
 - (iv) if the noise levels do not meet appropriate noise levels at the boundary, outline mitigation and management measures :
 - to minimise the generation of noise including in the selection of blades and turbine, sound insulation in the turbines and maintenance regimes
 - to minimise the transmission of noise to residences or key vantage points to minimise eg barriers, bunds, etc
 - to minimise the noise impacts at the receptors (eg insulation) or agreement with the affected residences.
 - (v) consider the risks associated with meeting noise performance criteria if the surrounding land use changes; can contingencies be built into the project if the risk are high.
- (d) outline the proposed monitoring program including if relevant community consultation and complaints handling measures.

Note: Reference should be made to the assessment and management methods and the performance criteria EPA's NSW Industrial Noise Policy, (2000) and Environmental Criteria for road traffic Noise. Consideration could also be given to New Zealand Wind Noise Standard NZS68081998 or South Australia EPA draft guideline for wind farms

4. Air quality issues

If major construction activities are to be undertaken:

- (a) identify any likely sources of air emissions from all construction activities including from transport, earthworks and any fabrication on site
- (b) consider the likely impacts at receptors taking into consideration worst case meteorological conditions
- (c) outline mitigation measures to control dust, such as dust suppression techniques and protocols; if appropriate, outline a monitoring program for dust and airborne particulates including monitoring locations

Note: Reference should be made to the assessment and management methods and the performance criteria EPA's Approved methods and Guidance for the modelling and assessment of air (2001) and Approved methods for the Sampling and Analysis of air pollutants in NSW (2001).

5. Soils, drainage and geological issues

Issues which may need to be considered include:

- (a) outline landscape characteristics including contours, terrain stability, slope gradient and length, drainage lines and any waterbody
- (b) outline soil characteristics including any constraints such as erodibility, permeability, contamination, problems with load bearing capacity or presence of acid sulfate soils. (Note: DLWC has soil landscape maps and Acid Sulfate Soil Risk Maps for some parts of the State; Local council maintain unhealthy building land lists)
- (c) describe any likely soil, water quality or landform related issues including:
 - (i) the potential for erosion having regard to the soil characteristics, landform and meteorological characteristics as a result of construction activities
 - (ii) potential hazards relating to subsidence (in mining areas, check with the Mine Subsidence Board), load-bearing characteristics,

- slippage problem, fault lines or other issues
- (iii) risk of contamination of soil or waterbodies during construction or maintenance operations (from fuels, oils or chemicals)
- (d) describe the proposed measures to mitigate or manage impacts including outline of:
 - (i) surface drainage, sediment and erosion management plan associated with the construction of the foundations and erection of towers including stabilisation works and run-off control measures and revegetation/rehabilitation measures
 - (ii) construction principles and maintenance regimes for access roads to ensure sediment and erosion issues do not arise, in particular in relation to any drainage line or creek crossing
 - (iii) if acid sulfate soils are likely to be disturbed, management plan to minimise disturbance, treat disturbed soils or acid water and monitor outcomes consistent with the *Acid Sulfate Soils Manual* (ASSMAC, 1998)
 - (iv) if contaminated soils, remediation plan including proposed methods and standard to which the area is to be remediated and monitoring program to track progress
- (e) the acceptability of impacts and the adequacy of the mitigation strategies, during construction to control soil and geological impacts.

Note: Reference should be made to Soil and Landscape Issues in EIA (DLWC 2000), Urban Erosion and Sediment Control (DLWC 1992), Australian Soil and Land Survey Field Handbook and Acid Sulfate Soils Manual (ASSMAC, 1998)

6. Flora and fauna issues

This section is of particular relevance when the project is proposed in the vicinity of important habitat or movement corridors of birds or bats or if vegetation is to be disturbed. Issues to consider include:

- (a) identifying bats and birds (including songbirds, parrots, birds of prey, shorebirds and waterfowl), their principal roosting, feeding, congregation and breeding areas, and their movement corridors/dispersal routes in the vicinity of the project site(s)
- (b) identify other ecological communities and if appropriate populations and species and their habitat which may be directly or indirectly affected by the proposal.
- (c) Indicate the local and regional scarcity of these species, populations, ecological communities, and their habitats, and their potential scientific, historic or cultural significance. If relevant, identifying the following, indicating their incidence on the site:
 - (i) threatened species, populations or ecological communities listed in Schedule 1 or 2 of the *Threatened Species Conservation Act 1995* (see Appendix 3) .
 - (ii) areas protected under SEPP 14- Coastal Wetlands, SEPP 19- Bushland in Urban Areas, SEPP 26 -Littoral Rainforest, SEPP 44- Koala Habitat Protection, *Native Vegetation Conservation Act 1998*, or other environmental planning instruments
 - (iii) trees listed in councils' Significant Tree Registers
- (d) discuss the potential impacts on species, populations or ecological communities including from:
 - (i) deaths from strikes (birds & bats) and from transmission lines
 - (ii) change in flight movement and associated behaviors
 - (iii) clearing of vegetation
 - (iv) loss/change of habitat
- (e) assess the sensitivity of species, populations or ecological communities to disturbance considering:

- (i) the importance of disturbance of aerial and terrestrial movement corridors or other habitat including in relation to breeding/ migratory cycles
- (ii) the potential for rehabilitation of disturbed areas and the time required for re-establishment
- (iii) the cumulative impacts on communities in the region
- (f) for projects involving public land is a component of the site, if relevant, identify any species occurring on that land of significance to the local Aboriginal community (eg as totems, medical or health purpose or bush tucker); outline measures to minimise the disturbance of these species; if disturbance cannot be avoided, outline mitigation measures including offsets if appropriate.
- (g) if relevant, assessing the significance of the area for koalas under the provisions of SEPP 44 – Koala Habitat Protection
- (h) if relevant, consideration of issues outlined in the Native Vegetation Conservation Act 1998
- (i) identify any existing or potential weed or pest problems; consider the impact of the proposal on their numbers and range; describe measures to control and prevent infestations at or adjacent to the site
- (j) describe any landscaping or rehabilitation proposals and the role in any mitigation strategy such as the provision of new compensatory habitats, rehabilitation with indigenous species; timing of major disturbances so as to minimise impacts on breeding and migration cycles; provisions to protect species or their habitats from accidental damage during construction
- (k) proposed monitoring to determine the effectiveness of mitigation and to verify predictions.

NOTE: The following NPWS references may be of assistance Aerial survey of wetland birds in eastern Australia, Birds of particular conservation concern in the western division of NSW and The threatened and non-threatened native vertebrate fauna of NSW: status and ecological attributes Appendix 3 provides guidance on determining when a species impact statement (SIS) is required. An SIS must accompany any proposal in critical habitats or where there is likely to be a significant effect on threatened species, populations or ecological communities or their habitats. Appendix 4 provides guidance on determining when a National Environmental Significance Assessment (NESA) is required under the EPBC Act. A NESA must accompany any proposal where there could be a significant impact on a item of national environmental significance.

7. Heritage issues

This section is relevant if the proposal involves land clearing, earthworks, disturbance of existing items (buildings, works, relics or places) or reduction of the heritage curtilage. Issues which may need to be considered include:

- (a) identifying any items of heritage significance at the site affected by the proposal. This should include two steps:
 - Step I:** collate information from any relevant heritage study or conservation plan for the site or area - this source may need to be supplemented with information from the following:
 - (i) relevant historical research on the area
 - (ii) consultation with Aboriginal community groups (which may include Aboriginal land councils and native title claimants, elders), local historical societies and the local council
 - (iii) inspection of heritage registers including State Heritage Register, (www.heritage.nsw.gov.au), local or regional environmental

plans, Aboriginal Heritage Information Management System (NPWS), National Estate Register (Australian Heritage Commission), other registers (eg National Trust).

Step 2: survey the area likely to be affected, to identify any items of potential heritage significance.

(b) For Aboriginal heritage:

- (i) identify and assess the significance of the Aboriginal heritage and cultural values of the site. These values may be associated with physical evidence of Aboriginal occupation, a traditional use of an area such as a ceremonial area; a spiritual attachment or historic use of an area or place; and/or contemporary values such as access to wild resources. This should include the use of natural resources for traditional purposes, as well as the cultural value attached to flora, fauna, landscapes and other items in the landscape. The assessment should be undertaken in consultation with relevant Aboriginal community groups and NPWS
- (ii) assess the potential impact of the proposal on the heritage significance; Aboriginal object or places cannot be destroyed, defaced or damaged without written consent from the Director-General of National Parks and Wildlife Service
- (iii) propose measures to mitigate impacts or to conserve the heritage significance of the area, object or place - if items or places of significance are to be disturbed, a conservation management plan may need to be prepared in consultation with the NPWS, relevant Aboriginal community groups, the Department of Aboriginal Affairs and the Heritage Office.

(c) For non-Aboriginal heritage:

- (i) assess the significance of any non-Aboriginal heritage items identified at the site, using criteria for assessing heritage significance published in the Heritage Office's guideline *Assessing Heritage Significance* (2000)
- (ii) assess the potential impacts of the proposal on the heritage significance of non-Aboriginal heritage items protected under the *Heritage Act 1977* or a planning instrument, These items require approval from the NSW Heritage Council, Australian Heritage Commission or local council before disturbance can be undertaken
- (iii) propose measures to mitigate impacts or to conserve items of heritage significance -if items of significance are to be disturbed a conservation management plan may need to be prepared in consultation with the Heritage Office.

(d) For natural heritage:

- (i) assess the heritage significance of any natural areas including geological or palaeontological features or ecological communities
- (ii) assess the potential impact of the proposal on the heritage significance (note: items identified in planning instruments or in conservation areas require the consent of the nominated approval authority)
- (iii) propose measures to mitigate impacts or to conserve the heritage significance -if natural areas of heritage significance are to be disturbed a conservation management plan may need to be prepared in consultation with the relevant authorities.

- (e) Consider the acceptability of impacts on heritage significance and assess the adequacy of the measures to mitigate impacts during all stages of the proposal.

Note: Reference should be made to NPWS (1997) Aboriginal Cultural Heritage Standards and Guidelines Kit. and NSW Heritage Office (2000) Assessing Heritage Significance -a NSW Heritage Manual update. Appendix 4 provides guidance on determining when a National Environmental Significance Assessment (NESA) is required under the EPBC Act. A NESA must accompany any proposal where there could be a significant impact on a item of national environmental significance.

8. Infrastructure and utilities issues

Identify infrastructure or utility services likely to be affected by the project:

(a) transmission network

- (i) identify any utilities infrastructure that would be affected by the proposed wind farm;
 - outline any augmentation necessary to this network as a result of the proposed wind farm, eg upgrading of substations, upgrading of line capacity
 - indicate the views of the relevant network service providers and who is responsible for these works and whether they are to be considered as part of the proposal
- (ii) identify the connection route between turbines and point of connection with any existing transmission network and / or any energy users
 - identify whether the connection is above or below ground, and justify the proposed approach
 - identify who is responsible for the connection and whether these works are to be approved as part of the proposal
 - if a new easement is required, indicate if owners agreement has been obtained for the route

(b) gas or water pipelines

- (i) identify any utilities infrastructure or service that would be affected by the proposed wind farm
- (ii) indicate the views of the relevant service providers as to the extent and nature of any disturbance during construction or operation of the facility
- (iii) outline measures to protect utilities either temporarily (during construction) or permanently or any proposed adjustment to the infrastructure or services

(c) airport or airfields

- (i) identify any airports or airfields in the vicinity with aircraft which could be affected by the operation of the facility
- (ii) indicate the views of the relevant airport authority as to the level of risk to the safe operations of the airport facility
- (iii) if appropriate, outline measure to enhance the safety of planes associated with the airport or airfield.

(d) telecommunication services

- (i) identify any radio, television, mobile phone and microwave transmissions which may be affected by electromagnetic interference from the project
- (ii) where interference is likely, then provide an assessment of the extent of the interference
 - indicate the views of the relevant service providers as to the

- extent and nature of any disturbance from the facility
- identify how the proposal can be located to mitigate these effects

(e) transport and roads issues

- (i) estimate the size, type and number of loads during construction phase. Identify potential source of loads and proposed mode of transport. A traffic impact study may be necessary for proposals involving significant numbers of vehicle movements during construction particularly if oversized vehicles; outline road safety measures to minimise risks to traffic during construction
- (ii) identify any public road routes for the transport of construction materials particularly oversized components or machinery;
 - discuss route options and justify the preferred option taking into consideration the standard of the existing road and existing usage patterns;
 - identify any road works required to upgrade the route (eg in relation to road bearing capacity, bridges, bends etc)
 - If relevant, outline the required approvals and the proposed schedule to undertake the works
- (iii) identify temporary or permanent access roads on the sites where the facilities are to be located; identify the standard of these roads
- (iv) identify any roads likely to be affected by blade flicker. Indicate the views of the relevant road authority (RTA or relevant councils) regarding the likely hazard; if appropriate, outline measures to minimise risks to driver safety

(f) Waste issues

- (i) Identify the types and volumes of waste generated during construction and operation of the facility including waste from any fabrication or assembling of components on the site, any construction material or spoil, any waste oils, greases or chemicals, or sewage.
- (ii) Outline the proposed waste management provisions including the approaches for managing the categories of waste eg avoidance, reuse, recycle or disposal including the proposed sites and transport arrangements.
- (iii) If waste material is to go to the local landfill, identify any special arrangements for the receipt of the waste and the impact on the life of the landfill.

9. Social issues

For wind farm proposals with potentially impacts on the community, the following issues may need to be considered:

- (a) review of the community consultation process, identifying any issues raised through this process
- (b) provide an overview of the community in the area where the wind farm is to be located, its sense of identity and how the community/area is view from within and without the community.
- (c) identify the principal components of the community including any Aboriginal communities or any sectors which may be disadvantaged; outline the economic base and employment patterns
- (d) identify properties to be acquired or leased and any residents or businesses likely to be affected; identify issues relating to potential division in the community between those whose properties directly affected (and benefiting from lease/sale arrangements) and those indirectly affected (but not benefiting).
- (e) if relevant, consider the social implications on the broader community

including:

- (i) impacts on community identity and cohesion or the cultural or physical character of the location and the potential flow-on effects in terms demand on community services
 - (ii) loss of amenity associated with, for example visual impacts, public safety or a sense of wellbeing
 - (iii) social implications of changes in local businesses, industries, agricultural activities, tourism and employment
 - (iv) the effect on future development in the area; for example on the demographic make-up, land use or land values
- (f) if relevant, consider the impacts on any local Aboriginal community including potential loss of amenity, change in employment or business opportunities, change in access to or disturbance of places (eg story or camp sites, plant collection areas) or impacts on heritage sites
- (g) consider the acceptability of social impacts and social equity issues including
- (i) the likely level of impacts on individuals, groups or the broader community; identify those who will benefit and those who will be adversely affected or disadvantaged by the project
 - (ii) the adequacy and reliability of the mitigation strategies (including design, management and monitoring measures) to minimise adverse impacts during construction and operation of the proposal.
 - (iii) if relevant, the measures proposed to offset impacts (which can not be feasibly further minimised) where individuals or groups are disadvantaged.

Note: Techniques for Effective Social Impact Assessment (Social Policy Directorate, 1995) provides a useful general guide for assessing community issues. The assessment of social issues should draw from information from other sections of the guideline (such as sections on noise, visual or economic issues) which may have implications for community wellbeing.

10. Economic issues

Issues which may need to be considered include:

- (a) the costs and benefits of providing, operating and maintaining the wind energy scheme relative to alternatives (including the do nothing option) – significant non-monetary costs and benefits should be described and qualitatively assessed; if relevant, the analysis should consider construction and maintenance costs; flow-on costs from the need to augment or increase the maintenance budget for local or regional electricity networks
- (b) environmental and social costs and benefits such as the effects on health, habitat, value, scenic qualities and amenity
- (c) identify construction and operational jobs likely to result from the project and whether these jobs are likely be sourced from the community;
- (d) where the wind energy proposal is likely to have an impact on a particular local or regional economy, the impacts on existing and future development and settlement patterns should be considered such as:
 - (i) the potential impact on property values
 - (ii) the potential for change in residential, rural residential and tourism development patterns
 - (iii) impacts on agricultural or forestry industries including potential severance impacts or loss of productive land
 - (iv) any additional employment, as a result of the proposal
 - (v) the any flow-on costs on the transmissions network.

11. Cumulative issues

Cumulative impacts may result from a number of activities with similar impacts interacting with the environment in a region. They may also be caused by the synergistic and antagonistic effects of different individual impacts interacting with each other. They may be due to the temporal or spatial characteristics of the activities' impacts. If cumulative issues have been identified and considered in a relevant study, these should be referred to in the analysis.

Issues to consider that relate to the particular wind energy proposal may include:

- (a) identify the potential for cumulative impacts from:
 - (i) other existing or planned wind farms in the area/region
 - (ii) other industry in the vicinity with similar impacts
- (b) outline any advantages or disadvantages from clustering wind farms in this location; identify any potential flow-on activities with cumulative impacts (i.e. would the proposal attract other development which would have adverse or beneficial environmental impacts which would not otherwise have occurred?)
- (c) identify any likely long-term and short-term cumulative impacts such as soil degradation, visual impacts or loss of heritage items, vegetation or fauna impacts:
 - (i) consider the receiving environment's ability to achieve and maintain any environmental objectives established for that system.
 - (ii) outline any actions that can be taken to minimise or compensate for cumulative impacts

F. MITIGATION AND MANAGEMENT MEASURES

The mitigation and management strategy should include

1. a compilation of the applicants commitments with regard to the location, layout, design or technology features to minimise or manage impacts on the environment and the environmental management principles which would be followed in the subsequent planning, design, construction and operation of the proposal
2. an outline of an environmental management plan (EMP) for the construction and operation of the wind farm
3. an outline of environmental monitoring, auditing and reporting program
4. an outline of the ongoing community consultation program including complaints management and conflict resolution measures
5. land use conflict assessment to determine the effectiveness of mitigation and management approaches to avoid, minimise or manage conflict.

1. List of approvals and licences

All approvals and licences required under any legislation must be identified. This is to alert relevant authorities as early as possible to their potential involvement in the project and to ensure an integrated approach to the granting of approvals. This list also informs the community of the authorities involved in the assessment and regulation of the proposal.

2. Outline of performance commitments and the environmental management principles

The section should contain a compilation of the applicant's commitments made throughout in the EIS or SEE in relation to avoidance, minimisation or management of impacts with regard to:

- (a) the location, layout, design or technology features to minimise or manage impacts on the environment; and
- (b) the environmental management principles to be followed in the subsequent planning, design, construction and operation of the proposal.

3. Outline of environmental management plan (EMP)

The EMP should demonstrate sound environmental practice during the construction, operation and decommissioning of the proposal. In developing mitigation measures and performance criteria, the principles of ESD must be considered include the principles of polluter pay and social equity including:

- (a) management of construction impacts; if appropriate include:
 - (i) erosion and sedimentation management
 - (ii) noise and dust
 - (iii) constraints on land clearing, rehabilitation and revegetation
 - (iv) waste management
 - (v) transport management
 - (vi) management of operation impacts including maintenance
- (b) environmental training programs for construction and operational staff and incentives for environmentally sound performance
- (c) if applicable, an indication of how the plan can be integrated into the organisations broader environmental management framework
- (d) an indication of how compliance with licensing and approval requirements will be achieved and due diligence attained
- (e) if applicable, a reporting mechanism on environmental performance.

4. Outline of Monitoring Program

This program should be carefully designed and related to the predictions made in the EIS and the key environmental indicators which would demonstrate the potential ecological sustainability of the proposal. The EIA document should outline the need for and use of any proposed monitoring, monitoring intervals and reporting procedures.

The program outline should describe the following monitoring details:

- (a) the key information that will be monitored, its criteria and the reasons for monitoring (which may be compliance with regulatory requirements)
- (b) the monitoring intervals and duration
- (c) procedures to be undertaken should the monitoring indicate a non-compliance or abnormality
- (d) internal reporting procedures and links to management practices and action plans
- (e) external reporting procedures to relevant authorities and the community.

Parameters which may be relevant include:

- (i) wind monitoring data
- (ii) generation performance
- (iii) light flicker and noise impacts (if relevant)
- (iv) ecological parameters (if relevant) relating to bird and bat impact rates

5. Outline of Community Consultation Program

This program should outline the commitments for ongoing communication with neighbours, special interest groups and with the broader community and to deliver on any commitments made to the community during the EIA phase. The purpose of the program is to conveying as appropriate, to relevant stakeholders:

- monitoring information and the level of compliance
- any changes in the operations
- outcomes of complaints management and any conflict resolutions

The Program should outline for the construction and/or operation phase of the project.

- the scope of the program, who is responsible, who will implement, who is the point of contact for the community
- any proposal for a Community Consultation Committee
- any proposed complaint management protocols including hot lines, response times guarantees and reporting responsibilities to ensure that complaints are promptly attended to and the complainant is advised of the outcome.
- any mechanism for reporting to the community such as an internet site, newsletter, drop in centre, notice board, open days, etc
- any proposed dispute resolution mechanisms to manage or resolve issues between the proponent and the community.

6. Land Use Conflict Avoidance Strategy

A land use conflict avoidance strategy should be developed to identify the potential for conflict based on the likelihood that individual and cumulative impacts may adversely affect individuals or groups in the community and to consider the likelihood of the proposed mitigation and management measures avoiding, minimising or managing conflict. Issues to be considered include:

- (a) Identify whether the proposal is consistent with current or proposed preferred land use.
 - (i) if the proposal is consistent, outline the provisions to ensure the

- maintenance of amenity or opportunity of nearby land uses.
- (ii) If the proposal is not consistent, in addition to the above:
 - identify the level of risk that non-compatible land uses will be located in the vicinity of the project in the short, mid or longer term
 - (b) Where adverse impacts are likely to be beyond the boundary, have all feasible options been considered to manage/minimise impacts at source or within the site to an “acceptable” offsite level
 - (c) Where adverse impacts are likely to be beyond the boundary (eg noise, visual impacts, electromagnetic interference or constraints on the use of their land), to minimise conflict:
 - (i) clearly identify the area and individuals likely to be affected and by which impacts
 - (ii) justify the level and method of mitigation measures to manage the impacts including from normal operation, incidents, accidents or when unusual weather conditions; if relevant outline any agreement with affected individuals on performance criteria to be met or offsets to compensate for adverse impacts
 - (iii) consider the likelihood of the mitigation/management measures being ineffective some or all of the time and the likely implications
 - (iv) consider the equity implications given the level of impacts, those being affected and management/mitigation regime: is there an appropriate balance of who benefits and who adversely affected in terms of loss of opportunities or amenity?
 - (d) Where adverse impacts are likely to be beyond the boundary, consider the risks associated with managing impacts if the surrounding land use changes; can contingencies be built into the project if the risk are high.
 - (e) Does the proposed environmental management regime:
 - (i) demonstrate a long-term commitment to avoiding or minimising land use conflicts
 - (ii) include a program for continuous improvement in relation to impacts likely to result in conflict now or in the future should land use in the impacted area change.
 - (f) Where the location of the proposal results in people being adversely affected by the project, will the proposed communication strategy assist in managing or avoiding conflicts.

G. JUSTIFICATION FOR THE PROPOSAL

Reasons justifying undertaking the proposal in the manner proposed should be outlined, taking into consideration potential health, biophysical, economic and social impacts, including costs and benefits and the compliance with the principles of ecologically sustainable development (see Appendix 7 for examples of issues).

The sustainability of the proposal should be outlined throughout all sections of the EIS as highlighted in this guideline, and specifically in terms of:

- (a) the ability of the proposal to demonstrate economic efficiency in meeting the short- and long-term community requirements
- (b) the ability of the proposal to meet broad environmental performance requirements including improved conservation or protection of resources, and reduced environmental costs
- (c) the ability of the proposal to meet site specific environmental performance requirements considering the vulnerability of the soil, surface waters, groundwater and the associated ecosystem
- (d) social equity considerations.

Appendix 1 Schedule 2 - Environmental Impact Statements

CONTENTS OF AN EIS

This appendix contains an extract from the Environmental Planning and Assessment Regulation 2000. Schedule 2 outlines the matters that must be addressed in an EIS pursuant to clause 72 and 230 of the EP&A Regulation.

1. Summary

A summary of the environmental impact statement.

2. The objectives

A statement of the objectives of the development or activity.

3. Analysis of alternatives

An analysis of any feasible alternatives to the carrying out of the development or activity, having regard to its objectives, including the consequences of not carrying out the development or activity.

4. Environmental assessment

An analysis of the development or activity, including:

- (a) a full description of the development or activity
- (b) a general description of the environment likely to be affected by the development or activity, together with a detailed description of those aspects of the environment that are likely to be significantly affected
- (c) the likely impact on the environment of the development or activity, and
- (d) a full description of the measures proposed to mitigate any adverse effects of the development or activity on the environment, and
- (e) a list of any approvals that must be obtained under any other Act or law before the development or activity may lawfully be carried out.

5. Compilation of measures to mitigate adverse effects

A compilation (in a single section of the environmental impact statement) of the measures referred to in item 4 (d).

6. Justification of development

The reasons justifying the carrying out of the development or activity in the manner proposed, having regard to biophysical, economic and social considerations, including the following principles of ecologically sustainable development:

- a) the precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
 - (i) In the application of the precautionary principle, public and private decisions should be guided by:
 - (ii) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the
 - (iii) environment, and
 - (iv) an assessment of the risk-weighted consequences of various options,
- b) Inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,
- c) Conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,
- d) Improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and service, such as,
 - (i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,
 - (ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,
 - (iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

Appendix 2 Threatened Species Conservation Act

Threatened Species Conservation Act	This appendix contains an extract from the <i>Threatened Species Conservation (TSC) Act 1995</i> and the provisions for assessing impacts on the conservation of critical habitat and threatened species, populations or ecological communities and their habitats.
What are critical habitat, threatened species, populations or ecological communities and threatening processes?	<p>Critical habitats are habitats for endangered species, population or ecological communities which are declared and threatened species, populations or ecological communities and threatening processes are prescribed by the:</p> <ul style="list-style-type: none"> • Minister for Environment in accordance with Part 3, Part 2 and Schedules 1 and 2 of the TSC Act of the <i>TSC Act</i> and • Minister for Fisheries under Part 7A, Schedules 4, 5 and 6 of the FM Act of the <i>Fisheries Management (FM) Act 1994</i>.
When is a Species Impact Statement required?	<p>Under section 77 (3) (dl) and section 112 (IB) of the EP&A Act, if a proposal :</p> <ul style="list-style-type: none"> • is on land that contains "critical habitat" or • is likely to significantly affect threatened species, populations or ecological communities, or their habitats, • a species impact statement (SIS) must be prepared in accordance with Division 2 of Part 6 of the TSC Act and with Division 6 of Part 7 A of the FM Act.
Factors when deciding if an SIS is required	<p>The following factors must be taken into account in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats:</p> <ol style="list-style-type: none"> a) in the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction, b) in the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised, c) in relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed, d) whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community, e) whether critical habitat will be affected, f) whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region, g) whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process, h) whether any threatened species, population or ecological community is at the limit of its known distribution.
Form and content of an SIS	Under section 110 of the TSC Act and sections 221J and 221K of the FM Act, the general requirements on the form and content of an SIS are as follows.
General Information	A species impact statement must include a full description of the action proposed, including its nature, extent, location, timing and layout and, to the fullest extent reasonably practicable, the information referred to in this section.
Information on threatened species and populations	<p>A species impact statement must include the following information as to threatened species and populations:</p> <ol style="list-style-type: none"> a) a general description of the threatened species or populations known or likely to be present in the area that is the subject of the action and in any area that is likely to be affected by the action, b) an assessment of which threatened species or populations known or likely to be present in the area are likely to be affected by the action, c) for each species or population likely to be affected, details of its local, regional

and State-wide conservation status, the key threatening processes generally affecting it, its habitat requirements and any recovery plan or threat abatement plan applying to it,

- d) an estimate of the local and regional abundance of those species or populations,
- e) a general description of the threatened species or populations known or likely to be present in the area that is the subject of the action and in any area that is likely to be affected by the action,
- f) a full description of the type, location, size and condition of the habitat (including critical habitat) of those species and populations and details of the distribution and condition of similar habitats in the region,
- g) a full assessment of the likely effect of the action on those species and populations, including, if possible, the quantitative effect of local populations in the cumulative effect in the region,
- h) a description of any feasible alternatives to the action that are likely to be of lesser effect and the reasons justifying the carrying out of the action in the manner proposed, having regard to the biophysical, economic and social considerations and the principles of ecologically sustainable development,
- i) a full description and justification of the measures proposed to mitigate any adverse effect of the action on the species and populations, including a compilation (in a single section of the statement) of those measures,
- j) a list of any approvals that must be obtained under any other Act or law before the action may be lawfully carried out, including details of the conditions of any existing approvals that are relevant to the species or population.

Information on ecological communities

A species impact statement must include the following information as to ecological communities:

- a) a general description of the ecological community present in the area that is the subject of the action and in any area that is likely to be affected by the action,
- b) for each ecological community present, details of its local, regional and State-wide conservation status, the key threatening processes generally affecting it, its habitat requirements and any recovery plan or any threat abatement plan applying to it,
- c) a full description of the type, location, size and condition of the habitat of the ecological community and details of the distribution and condition of similar habitats in the region,
- d) a full assessment of the likely effect of the action on the ecological community, including, if possible, the quantitative effect of local populations in the cumulative effect in the region,
- e) a description of any feasible alternatives to the action that are likely to be of lesser effect and the reasons justifying the carrying out of the action in the manner proposed, having regard to the biophysical, economic and social considerations and the principles of ecologically sustainable development,
- f) a full description and justification of the measures proposed to mitigate any adverse effect of the action on the ecological community, including a compilation (in a single section of the statement) of those measures,
- g) a list of any approvals that must be obtained under any other Act or law before the action may be lawfully carried out, including details of the conditions of any existing approvals that are relevant to the ecological community.

Credentials of persons undertaking an SIS

A species impact statement must include details of the qualifications and experience in threatened species conservation of the person preparing the statement and of any other person who has conducted research or investigations relied on in preparing the statement.

State-wide conservation status

The requirements of subsections (2) and (3) [above] in relation to information concerning the State-wide conservation status of any species or population, or any ecological community, are taken to be satisfied by the information in that regard supplied to the principal author of the species impact statement by the NPWS, which information that Service is by this subsection authorised and required to provide.

**Procedures for
preparing an SIS**

Under section 111 of the TSC Act, the Director-General of National Parks and Wildlife and under section 221L of the FM Act, the Director of NSW Fisheries must be consulted in writing for the requirements for an SIS. These requirements must be provided within 28 days from when a request is made.

Because of the circumstances of the case, the Director-General of National Parks and Wildlife/Director of NSW Fisheries may limit or modify the extent of matters prescribed in sections 110 TSC Act and 221J and 221K FM Act. In other cases if the impacts are considered to be trivial or negligible, the Director-General of National Parks and Wildlife/Director of NSW Fisheries may dispense with the requirements for an SIS to be prepared.

An SIS may be prepared as a separate document or incorporated in an EIS. If the SIS is separate to the EIS, it must be exhibited concurrently with the EIS.

The SIS must be in writing and be signed by the principal author of the document and the applicant/proponent.

Appendix 3 National Environmental Significance

Commonwealth Environment Protection and Biodiversity Conservation Act

The *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) commenced on 16 July 2000. The Act introduces a new assessment and approvals system for:

- actions that have a significant impact on matters of national environmental significance (NES)
- actions that have a significant impact on the environment of Commonwealth land.
- actions carried out by the Commonwealth Government.

National Environmental Significance

An EPBC approval is required for any action that significantly affects the following matters of national environmental significance (NES):

- Nominated World Heritage areas .
- Wetlands protected by international treaty (the Ramsar convention)
- .Nationally listed threatened species .
- Nationally listed migratory species
- All nuclear actions
- The environment of Commonwealth marine areas
- Commonwealth land

The Commonwealth may add to this list. The Environment Australia website (<http://www.environment.gov.au/epbc>) should be consulted for up to date information.

Controlled Action

Under the provisions of the EPBC Act, an action that needs Commonwealth approval is called a controlled action. In accordance with a bilateral agreement between the Commonwealth and NSW Government, approvals under the Commonwealth and State legislation can be obtained through one process.

All controlled actions under the EPBC Act would have to be accompanied by an assessment report that is prepared in accordance with DUAP's Guideline *Commonwealth Environment Protection and Biodiversity Conservation Act 1999 - Guide to implementation in NSW*. This assessment report would be called a National Environmental Significance Assessment (NESA). Where the action needs an EIS or SEE under the EP&A Act, the NESA could form part of that document.

The EPBC Act does not change any assessment requirement under the EP&A Act, eg the need for a species impact statement (SIS) where necessary under NSW law.

Assistance in determining whether a proposal needs to be referred to the Commonwealth for approval

Environment Australia's *Administrative guidelines for determining whether an action has, will have, or is likely to have a significant impact on a matter of national environmental significance under the Environment Protection and Biodiversity Conservation Act 1999* will assist Proponents in determining whether to refer a proposal to the Commonwealth for a decision on whether approval will be needed under the EPBC Act.

In addition, an EPBC on-line information system is available at Environment Australia's web site and can be used to help determine whether a specific action may need referral. The system allows a proposal's location to be entered and a search made against geographic information on matters protected under the EPBC Act. Referrals may be submitted by mail Referrals Section (EPBC Act), Approvals and Legislation Division, Environment Australia, GPO Box 787, CANBERRA ACT 2601, or facsimile (026274178) or electronically epbc.referrals@ea.gov.au.

The requirement for Commonwealth approval changes the NSW assessment process. Therefore, before State assessment begins, a decision regarding a referral should be made by the Commonwealth. For more information about the EPBC Act and for a guideline on National Significance Criteria and for guidance on when proposals must be referred to Environment Australia, call Environment Australia's Community Information Unit on 1800803 772 or visit the web site (<http://www.environment.gov.au/epbc>).

For NSW proposals, further information is provided in the Department of Planning's *Commonwealth Environment Protection and Biodiversity Conservation Act 1999 Guide to Implementation in NSW*

Appendix 4 Consultation and approvals

Integrated development

Integrated development is development that requires development consent and one or more of a number of approvals listed in s.91(1) of the EP&A Act. The State agencies responsible for granting one of the approvals listed below are referred to as "approval bodies" and include EPA, NPWS, DLWC, RTA, Heritage Office and NSW Fisheries. For each development there can be more than one approval body.

Act	Provision	Approval	Authority
Fisheries Management Act 1994	s 144	aquaculture permit	NSW Fisheries
	s 201	permit to carry out dredging or reclamation work	
	s 205	permit to cut, remove, damage or destroy marine vegetation on public water land or an aquaculture lease, or on the foreshore of any such land or lease	
	s 219	permit to: (a) set a net, netting or other material, or(b)construct or alter a dam, floodgate, causeway or weir, or (c) otherwise create an obstruction, across or within a bay, inlet, river or creek, or across or around a flat	
Heritage Act 1977	s 58	approval in respect of the doing or carrying out of an act, matter or thing referred to in s 57 (1)	Heritage Office
Mine Subsidence Compensation Act 1961	s 15	approval to alter or erect improvements within a mine subsidence district or to subdivide land therein	Mine Subsidence Board
National Parks and Wildlife Act 1974	s 90	consent to knowingly destroy, deface or damage or knowingly cause or permit the destruction or defacement of or damage to, a relic or Aboriginal place	NPWS
Protection of the Environment Operations Act 1997	ss 43 (a), 47 and 55	Environment protection licence to authorise carrying out of scheduled development work at any premises.	EPA
	ss 43 (b), 48 and 55	Environment protection licence to authorise carrying out of scheduled activities at any premises (excluding any activity described as a "waste activity" but including any activity described as a "waste facility").	
	ss 43 (d), 55 and 122	Environment protection licences to control carrying out of non-scheduled activities for the purposes of regulating water pollution resulting from the activity.	
Rivers and Foreshores Improvement Act 1948	Part 3A	permit under Part 3A	DLWC
Roads Act 1993	s 138	consent to: (a) erect a structure or carry out a work in, on or over a public road, or(b) dig up or disturb the surface of a public road, or(c) remove or interfere with a structure, work or tree on a public road, or(d) pump water into a public road from any land adjoining the road, or (e) connect a road (whether public or private) to a classified road	RTA for major roads and Council for all other public roads
Water Act 1912	s 10 s 13A s 18F s 20B s 20CA s 20L	licence to construct and use a work, and to take and use water, if any, conserved or obtained by the work, and to dispose of the water for the use of occupiers of land licence to construct a supply work and to take and use water obtained thereby permit to construct and use a work, and to take and use water, if any, conserved or obtained by the work, and to dispose of the water for the use of occupiers of land for any purpose other than irrigation authority to take water from a river or lake for the purposes of a joint water supply scheme authority to construct a supply work and to take and use water conserved or obtained thereby group licence	DLWC
	s 116	licence to commence sinking a bore or to enlarge, deepen or alter a bore	
	Part 8	approval to construct a controlled work	

Consultation and Approvals	It is the responsibility of the person preparing the EIS to determine what approvals will be required as a result of the proposal and to demonstrate that the proposal can meet all approval and licensing requirements. In preparing the EIS, consultation with relevant parties should be undertaken early in the EIA process and their comments taken into account in the EIS.
Local Councils	for information on permissibility and consistency of the proposed development with the strategic planning of the areas, for information on "who" to consult, for development approvals under Part 4 of the EP&A Act if local development, also approval for any alteration to local roads, drains or buildings or trees of local heritage significance. Under s109 of the EP&A Act, a construction certificate must be issued by prior to any building works commencing. The purpose of a construction certificate is to ensure that the building is safe for use, taking into consideration structural and fire safety matters.
Department of Planning	for development approvals under Part 4 if State Significant Development, for Director-General's requirements if designated development, and for concurrence if the proposal impacts on SEPP 14 Coastal Wetlands, SEPP 26 Littoral Rainforest, potential or actual koala habitat under SEPP 44 Koala Habitat Protection
Environment Protection Authority	for environment protection licences under <i>The Protection of the Environment Operations Act 1997(PO EO Act)</i> if scheduled premises or information on pollution control and waste management.
Department of Land and Water Conservation	<i>Soil and Vegetation Management</i> for information on soils; design and construction of erosion and sediment controls and rehabilitation; approvals on protected lands <i>State Lands Services</i> regarding effect of development on any Crown land; for leasing, licence, or purchase; whether the land is subject to Aboriginal land claim or Native Title legislation; if Crown Reserves and dedicated lands exist, whether the proposal is compatible with the stated public purpose <i>State Water Management</i> regarding impact on ground or surface water resources; clearing riparian vegetation; works within 40 metres of a stream <i>Coastal and Rivers Management</i> regarding flooding and coastal areas Water Services Policy regarding approvals under the <i>Local Government Act 1993</i> ; for information on the relevant <i>Catchment Management Committees or Trusts</i>
Relevant service authorities	such as the Council or authority responsible for the provision of water, electricity, gas, telecommunication, drainage, flood mitigation, sewerage or other utility services
National Parks and Wildlife Service	if the proposal requires a species impact statement (SIS) to be prepared; will possibly result in the destruction, defacement or damage of an Aboriginal object or place; or there will be an impact on land dedicated or reserved under the National Parks and Wildlife Act
NSW Fisheries	The Fisheries Management Amendment Act 1997 applies a protection regime to marine and freshwater flora and fauna similar to the TSC Act. Approvals are required to dredge, build outfalls or impose other impacts on sea grasses and aquatic reserves.
NSW Agriculture	if the proposal is on land with high agricultural value or will cause dislocation to the agricultural industry
NSW Health Department	with regard to the potential health hazard caused by the operation and siting of the facility
WorkCover	for responsibilities regarding handling of dangerous goods and hazardous substances
Sydney Catchment Authority	for any water or sewerage proposal likely to impact on catchments within the Greater Sydney Region
Heritage Office	if the proposal is likely to affect any place or building having State heritage significance or if the proposal is affected by a Conservation Planning Order
Department of Aboriginal Affairs	if the proposal is in an area of significance to the Aboriginal community. Local Aboriginal Land Councils may also need to be consulted

Department of Mineral Resources	if a resource management plan applies or if the proposal is in an area of important mineral resources, concerning its responsibilities under Sydney REP No 9- Extractive Industry, and for safety and blasting. Mining Subsidence Board if the proposal is in an underground mining area
Roads and Traffic Authority	if the proposal is likely to result in significant traffic impacts or affect road infrastructure. Rail Infrastructure Corporation if the proposal impacts on rail infrastructure. Office of Marine Safety and Port Strategy on any activities on navigable waters
State Forests of NSW	in relation to impacts on State Forests
Ministry of Energy and Utilities	in relation to strategic policy advice, regulation and operational issues
Sustainable Energy Development Authority (SEDA)	in relation to energy and greenhouse issues
Department of Bushfire Services	if the area is in a location of bushfire hazard
CASA and any nearby airports	if the proposal is likely to have impacts on aircraft
Environment Australia	for advice as to whether the provisions of the EPBC Act apply to the proposal.

Appendix 5 Schedule 3 – Designated Development

This appendix is an extract from Schedule 3 of the EP&A Regulation 2000 and prescribes electricity generating stations which are designated under Part 4 of the EP&A Act. This designation only applies to proposals that require development consent under the provisions or a planning instrument.

Designated Development	<ol style="list-style-type: none">1) Electricity generating stations, including associated water storage, ash or waste management facilities, that supply or are capable of supplying:<ol style="list-style-type: none">a) electrical power where:<ol style="list-style-type: none">i) the associated water storage facilities inundate land identified as wilderness under the Wilderness Act 1987, orii) the temperature of the water released from the generating station into a natural waterbody is more than 2 degrees centigrade from the ambient temperature of the receiving water, orb) more than 1 megawatt of hydroelectric power requiring anew dam, weir or inter-valley transfer of water, orc) more than 30 megawatts of electrical power from other energy sources (including coal, gas, wind, bio-material or solar powered generators, hydroelectric stations on existing dams or co- generation)2) This clause does not apply to power generation facilities used exclusively for stand-by power purposes for less than 4 hours per week averaged over any continuous 3-month period.
Are alterations or additions designated development?	<p>Is there a significant increase in the environmental impacts of the total development?</p> <p>Development involving alterations or additions to development (whether existing or approved) is not designated development if, in the opinion of the consent authority, the alterations or additions do not significantly increase the environmental impacts of the total development (that is the development together with the additions or alterations) compared with the existing or approved development.</p>
Factors to be taken into consideration	<p>In forming its opinion, a consent authority is to consider:</p> <ol style="list-style-type: none">a) the impact of the existing development having regard to factors including:<ol style="list-style-type: none">i) previous environmental management performance, including compliance with the conditions of any consents, licences, leases or authorisations by a public authority and compliance with any relevant codes of practice, andii) rehabilitation or restoration of any disturbed land, andiii) the number and nature of all past changes and their cumulative effects,b) the likely impact of the proposed alterations or additions having regard to factors including:<ol style="list-style-type: none">i) the scale, character or nature of the proposal in relation to the development, andii) the existing vegetation, air, noise and water quality, scenic character and special features of the land on which the development is or is to be carried out and the surrounding locality, andiii) the degree to which the potential environmental impacts can be predicted with adequate certainty, andiv) the capacity of the receiving environment to accommodate changes in environmental impacts, andc) any proposals:<ol style="list-style-type: none">i) to mitigate the environmental impacts and manage any residual risk, andii) to facilitate compliance with relevant standards, codes of practice or guidelines published by the Department or other public authorities.

Appendix 6 Sustainability Principles Checklist

The following are examples of factors that should be considered in deciding the acceptability of a proposal based on sustainability principles.

Sustainability Issues	Examples of matters for consideration
<p>Conservation of biological diversity and ecological systems</p>	<ul style="list-style-type: none"> • loss of/or unacceptable risk to endangered species or habitat (and use of offsets to mitigate unavoidable significant impacts) • commitment to rehabilitating degraded areas • sustainability of use of natural resources • improvement of knowledge base (re: impacts and management of impacts) • opportunity for conservation of ecosystems • production of “greenhouse” gases (and use of offsets to mitigate unavoidable increases) • use of ozone depletion gases (and use of offsets to mitigate unavoidable use) • significant impacts on, and proposed management of soil • potential for levels of nutrients or salts in soil to go beyond an “acceptability” level (and use of offsets to mitigate potential increases) • potential for salinisation or acidification (and use of offsets to mitigate unavoidable salinisation or acidification) • use and/or release of toxic chemicals or heavy metals in soil, air or water, and proposed management • significant impacts on aquifers or fluvial environmental flow (and use of offsets to mitigate dropping below acceptability levels) • significant impacts on, and proposed management of water quality (both groundwater and surface water) (and use of offsets to mitigate unavoidable significant impacts) • noise, vibration, dust or odour level impacts and management (and use of offsets to mitigate unavoidable significant impacts) • potential for bioaccumulation of substances beyond “acceptable” levels (and use of offsets to mitigate this) • compliance with relevant strategies/plans/policies and strategic planning performance indicators, standards or parameters.
<p>Social/Cultural/Community</p> <ul style="list-style-type: none"> • <i>maintain or enhance health, diversity and productivity of current generation</i> • <i>stewardship for future generations</i> 	<ul style="list-style-type: none"> • significant concerns expressed by the community during public consultation • commitments to ongoing consultation with the community particularly for major projects with significant impacts • sustainability of use of environmental and social resources • sustainable recycling options for resources • improvement of knowledge base (re: efficiency of use or recycling of resources or management of the disposal of waste in a sustainable manner) • potential for a significant risk of environmental damage • potential for assimilative capacity of the environment to be exceeded (and use of offsets to mitigate potential exceedances) • significant impacts on health of individuals or society (and use of offsets to mitigate significant impacts) • significant impacts on social equity (and use of offsets to mitigate significant impacts) • significant impacts on cultural heritage values (and use of offsets to mitigate significant impacts) • social benefits to local or regional community • potential for project to generate local or regional employment and business activity in areas identified as being in need of jobs/business activity (multiplier effect) • financial viability of project

Considering improved valuation issues

- *polluter pay*
- *appropriate valuing of resources*
- *cost effective environmental stewardship*

Would the implementation of the proposal:

- result an appropriate valuation of the resources used or affected by the proposal, with resources being appropriately valued, costed and considered
- result in the costs of any pollution or environmental degradation being internalised
- result in the applicant committing to appropriate monitoring, training and management regimes and being willing to meet the costs of compliance and compensation for non-compliance
- result in energy, water and other resources efficiencies and the use of renewable resources being maximised
- result in maximising recycling of material when it is resource efficient
- result in maximising output from the proposal per unit of energy or other resource inputs

Precautionary principle

- *avoid harm*
- *risk weighted evaluation of options*

- acceptability of level of social and environmental risk and worst case outcomes (and use of offsets to reduce risk)
 - use of safety margins and best available technology
 - potential use of incentive mechanisms to achieve sustainable development
 - scientific uncertainty about the outcomes (a peer review of key issues may be undertaken to ascertain this)
 - informational uncertainties about outcomes (are there gaps in knowledge or does information exist and the proponent has ignored it or does not know about it)
 - adequacy of community consultation considering scale and type of project, and potential for significant impacts on the local or regional community
 - commitment to identifying targets and indicators
 - suitability of proposed monitoring and auditing programs to provide for early-warning of environmental degradation
 - suitability of proposed reporting programs (to community and approval authorities)
 - provision of feedback loops to management to minimise harm
-

Appendix 7 References

The following are some references that may be of assistance to those preparing EIS or SEE. This list is by no means exhaustive.

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WEDNESDAY MARCH 07 2001

How green are our turbine valleys?

SIMON JENKINS

Tony Blair yesterday spoke on the environment in an overheated hall in St James's Square. He should have spoken somewhere else. He should have spoken at Ordnance Survey reference SN828953, in the moorland north of Dylife in Mid-Wales. There he could have seen his green policy in action. He could have seen a spectacle of such appalling desecration that words (almost) fail me.

The landscape is among the most beautiful in upland Britain. It stretches from the borders of Snowdonia down the spine of the Cambrian Mountains to the Brecon Beacons. It was too little-known to be included in any national park and is ignored by the National Trust, which recently blew £3.5 million "rescuing" the perfectly safe Snowdon, largely because someone in London had heard of it.

From the wilderness above Dylife, Mr Blair would see perhaps 1,000 square miles of country that is now as turbine-infested as a Gulf oilfield. The region contains the largest concentration of wind turbines in Europe, with more than 250 visible from most vantage points. In the past decade Mid-Wales has become the dumping ground for 45 per cent of Britain's subsidised totems to environmental diplomacy. The scene is awful. Were these the South Downs, the nation would have apoplexy.

The turbines are everywhere. To the north march those of Cemmaes Ridge, a row of crucifixes rising as a giant Golgotha over the upper Dovey Valley. To the east run the Carno turbines, boasted as Europe's biggest single wind power station. South are the Llandinam turbines above Llanidloes, Europe's second biggest field after Carno. To the west are the turbines that line both sides of the once-lovely Rheidol Valley, running down to Cardigan Bay. The new Cefn Croes power station is planned to be the biggest in Britain, requiring 39 turbines, each 328ft high. There are further reports of turbines proposed along the actual 2,500ft summit of Plynlimon. Nobody seems to give a damn. The depredation is beyond belief.

These machines are good for nothing but boasting at Earth Summit conferences. They were conceded by Michael Howard and John Gummer in pledging a "10 per cent renewable" energy quota, and dumped on Wales by Tory Secretaries of State, John Redwood and William Hague. With no strategic planning control, hill farmers have rushed to claim the £2,000-a-year rent from each turbine. Yet such ruined countryside is worthless for its one long-term use, recreation. The Welsh Tourist Board should be sacked for failing to defend its most precious asset, landscape, first against conifers and now against these forests of whirling steel. Tourists should boycott mid-Wales unless and until they are dismantled.

The turbines generate footling amounts of energy. Whenever I see them, only half are working. They cannot turn in light wind and must be switched off in a strong one, so that they operate at barely 25 per cent of their quoted output. They exist only because government demands a cross-subsidy from a levy on fossil fuel bills. A recent turbine in Ayrshire claimed to be the first to "operate without subsidy", but that was assuming peak output. Critics claim that each turbine uses more fossil fuel in construction and maintenance than it saves in a lifetime. The 160 turbines of the huge Carno and Llandinam fields yield the same energy in a year that a normal power station produces in four days. We could erect turbines in every park,

cliff, bay and estuary — we could destroy every scenic vista in the land — and still not generate 2 per cent of Britain's energy needs.

Wind turbines evince the ultimate Nimbyism. They are located in parts of Britain that London politicians never visit, since most now holiday abroad. Imagine Mr Blair's fury if the Italian Government erected 60 turbines on a hill opposite San Gimignano or near his regular Gascony retreat. Yet he is promoting turbines along the coast of Cornwall and Devon. He has them climbing the Pennines above the Dales. He has them encircling the Lake District. Like 19th-century aristocrats despoiling the Highlands in the name of sport, Labour's metropolitan elite neither knows nor cares about the British landscape, so long as it can cut a dash at the next international summit. In the name of the environment, the environment is destroyed.

Earlier this week, the British Government joined the rest of Europe in expressing "concern" at the Taleban regime in Afghanistan, for smashing ancient Buddhas in the name of religion. How could these fanatics, we asked, seek short-term political gain by wrecking the timeless heritage of their country? Offers poured in to buy or guard the statues carved into the hills of the Hindu Kush. Despite these protests, soldiers were sent with mortars and dynamite to blast them to pieces.

If I were a Taleban leader I would accuse Britain of hypocrisy. I would thank Mr Blair for reminding me of the glory of the Hindu Kush, perhaps asking when he last paid it a visit. I would point out that destroying heritage for short-term political gain is not unique to Afghanistan. What was Mr Blair doing to protect the London skyline or the English countryside? Why did I read that Mr Blair was desecrating the wild places of ancestral Britain, the mountains of the Celtic gods, with his giant gyrating crucifixes? What god was he appeasing? The British should consult their much-vaunted Bible, and consider the beam in their own eye before protesting the Afghan's mote.

I am all for renewable energy, though the Earth's reserves of fossil fuel are so huge that it takes an apocalyptic "green" to fear their imminent exhaustion. I remain an enthusiast for nuclear power, which does little atmospheric damage and is highly efficient, if and when we can ensure its safety. Solar power is cheap and not unsightly. Geothermal energy from under ground is as yet in its infancy. Wave energy is still expensive to extract. Wind power is the least efficient of all to gather, and the most environmentally intrusive. The green lobby still loves it. We can all watch Jonathon Porritt's view with interest as his beloved turbines now move up from Stroud towards his Gloucestershire back yard.

By far the best way to conserve fossil fuel is to use less of it, to insulate buildings, restrain consumption and discourage mobility. Yet the present Government last autumn cut petrol taxes to appease the transport lobby. If ever there were a case of "political shorttermism", this was it. Mr Blair is blatantly unserious on this issue, so why should he be allowed to destroy what is left of the British countryside to win a few headlines? No sensible person regards wind energy as efficient, but some at least find turbines beautiful. I would agree that some industrial structures are appealing. The granite stacks of Cornwall's tin mines fuse gracefully into their cliffs. The vapour flumes that rise over the cooling towers of the Trent Valley can, in the right light, have a eerie charm. The pylons that march across much of England are handsome to some eccentric souls. But even we do not build cooling towers on Helvellyn. We do not push pylons through Suffolk villages or down the Golden Valley. Wind turbines are worse than either. Their materials are alien to the landscape and their movement is

visually distracting. It would be hard to design structures so hostile to the natural wildness and serenity of Britain's uplands.

Those who want turbines should build them in their own backyards. They never do. Wind turbines are industrial machines and should be confined to sites where they intrude least on the natural environment. If turbines only work on prominent hill-tops, that is too bad. I am sure hotels and bungalows work best there too. Planning cannot collapse before people who would gladly put a Hilton on Snowdon and a motorway through the High Peak. It is incredible that we must have this argument in the 21st century.

But let us give politicians the benefit of the doubt. Let us assume that they act from ignorance rather than sin. Those who holiday in France and Italy can surely comprehend scenic beauty. Perhaps nobody has told Mr Blair and his court that Britain too has fine scenery. So let the famous motorcade head out to map reference SN828953, and see what this is all about.

simon.jenkins@thetimes.co.uk

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Windmill plan gets buffeted by critics

Worries revolve around noise, property values

By Julie Deardorff, Tribune staff reporter.

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McHenry Final

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TISKILWA, Ill. -- Modern windmills may appear sleek and sensible, but they are not universally loved. To Bob Bittner, they're a nasty scar on the horizon, a vision he'll confront daily if one of Illinois' first commercial **wind** farms ever gets off the ground. But after breezing past a local planning board, one of the largest proposed **wind**-energy projects east of the Mississippi has hit an unexpected snag: the Bittner family, whose modest farmhouse would be surrounded by more than 30 towering, whooshing **wind** generators.

The vocal family members are not the only people tilting at the proposed Crescent Ridge **wind**-energy project, but they have been instrumental in rallying the neighbors and stalling the approval process. Groundbreaking was expected to begin this month, but opponents have raised so many questions about the impact of the slender, skyscraper-size turbines on health, dairy cows, property values and the scenic landscape that all of October has been set aside for special hearings before the county zoning board of appeals.

The 28-member Bureau County Board is expected to vote on the **wind farm** in November. Meanwhile, another proposed Illinois **wind farm**, this one straddling Lee and DeKalb Counties, is having better luck. Last week the project sailed past the Lee County Board.

"I expected this to a certain degree, but never with this tenacity," said Stefan Noe, an environmental attorney who battled industrial polluters for community groups before starting Illinois **Wind** Energy to bring the concept to Bureau County, 110 miles west of Chicago. "There has been a lot of misinformation aggressively circulated to local landowners to stir people up as much as possible."

Though **wind** generation has doubled since 1998 and is hailed as a small part of the solution to the country's addiction to oil, pockets of resistance like the one in Bureau County are popping up across the country. Opponents are beginning to coordinate efforts with anti-**wind-farm** crusaders from other states, sharing information, experts and experience.

The \$55 million Crescent Ridge project, named for the picturesque ridge it would sit on, proposes using 34 **wind** turbines to harness the breeze that moves at an average of 16 m.p.h. The 256-foot turbines have colossal arms that slowly sweep half the size of a football field and could generate enough power for 20,000 homes.

The energy--51 megawatts-- would be bought by Commonwealth Edison and become part of a wholesale product called Ecopower, said Noe, whose company has partnered with Toman Power Corp. on the project.

Touted as a clean, renewable, free source of energy, windmills do not produce carbon dioxide or other greenhouse gases and can offset air pollution created by conventional fossil fuel sources. **Wind** turbines also are a free and steady cash crop for farmers who need stability. The 13 local landowners who lease their property would collect a

minimum of \$5,000 a **turbine** each year and can make more based on energy production, officials said.

Concerns raised at the public meetings, however, range from the health of birds to worries over noise, shadows, television reception and stray voltage. Though earlier **wind** turbines killed birds, and Bureau County is in a migratory bird flyway, newer models seem to have solved the problem. Opponents are still skeptical.

Objectors also don't believe the turbines will be quiet, unobtrusive neighbors. But the project will comply with regulations set by the Illinois Pollution Control Board, said Greg Zak, the longtime noise expert for the Illinois Environmental Protection Agency, who examined project data.

Worries over nearby cattle

Then there is the unanswered question of stray voltage, an important issue to Darrell Fox and his family, who turned down two windmills but worry the ones nearby will affect their award-winning dairy cows. Stray voltage, debated since the 1960s, is a low-level electrical current that leaks from a utility's distribution system or **farm** wiring and may affect animals. It typically originates from improper wiring, poor grounding or faulty equipment.

But the project's power-collection system is not connected to the local electrical service that serves **farm** buildings, Noe said, and thus it would not be likely to cause stray voltage.

"It's a totally different highway," he said.

Fox, 28, who farms the land with his parents, is still uncertain. "I went in with an open mind and didn't have a clue about any of this, but as we go on, I get more concerned," Fox said.

After a controversial **wind farm** went up in Kewaunee County, Wis., a 2001 survey by the Lincoln Township Moratorium Study Committee in the county found that most people were able to coexist with the gigantic structures despite the shadow they cast over the crops.

Though some of the 233 respondents said the **wind** turbines were "pleasing to see" and "relaxing to watch," others complained that their television flickered at the same rate as the **turbine** blade and that there was too much traffic because of gawkers.

The **wind** turbines "are not causing problems--they're just annoying. They surround us," one respondent wrote. "They've ruined the night sky," wrote another.

Neighbors often divided

The closer the residents lived to the turbines, the more the problems increased, except for those who had turbines on their property, said Ron Yesney, the community development educator for the Kewaunee County-University of Wisconsin Extension who worked on the study.

"Most of the problems came from people living in close proximity but not on the property," Yesney said. "They were getting the externalities, without any of the benefits." The same might be true for the Bittners, who would be completely encircled by the turbines, at least 10 of which are on land they used to own. They would not benefit financially, because none of the turbines are on their land.

"If we still had the land, there would be no project," said Bob Bittner, who leads the Coalition Against Rural Exploitation with his wife, two of his children and their families. Scott and Valerie Jensen, the Bittners' next-door neighbors, agreed to host nine of the 34 **wind** turbines on their property after packing up the four children and driving seven hours to visit a **wind farm** in Cerro Gordo, Iowa. They have since visited landowners at **wind** farms in Wisconsin and Pennsylvania and have no qualms about living three-quarters of a mile to a **wind** generator.

"We were intrigued financially," Scott Jensen said. "We see nothing negative. It's a win for landowners, a win for the county with taxes."

Recently, Crescent Ridge officials bused about 55 people to a **wind farm** in Monfort, Wis., the closest facility to Bureau County. County Board member Dick Heaton said he heard just one negative comment from a landowner who complained when local power was cut for two hours.

"I get to vote on this circus we're seeing, and I think Bureau County is lucky to have this opportunity," said Heaton, of Princeton.

Kathy D'Amore, a landowner in Milo Township in Bureau County, who commutes to her job in La Grange so she can live in the country, flatly disagrees.

"It's big businesses rolling over people who are not well advised," D'Amore said.

GRAPHIC MAP GRAPHIC: **Wind** turbines would surround resident. The Crescent Ridge **Wind Farm** project in western Illinois has drawn opposition from residents who say the power-producing turbines would be tall nuisances. If approved in November, the project would produce enough energy to power 20,000 homes. **TURBINE FACTS:** Total height: 381 feet Total weight: 125 tons Average output: 1,500 kilowatts Rotor diameter: 237 feet Tower: 256 feet **RELATIVE NOISE LEVELS** in decibels - Falling leaves - **Wind turbine** - Lawn mower - Jet aircraft Source: PB Power Chicago Tribune - See microfilm for complete graphic. MAP: Bittner residence.