

Wind Farms: A Reality Check

CO₂ emissions

- Electricity generated from wind turbines is unpredictable
- Conventional power stations, running inefficiently and producing CO₂, are needed as backup
- CO₂ is produced in the manufacture of thousands of cubic feet of concrete for the base of each turbine
- Lorries constructing the bases and road infrastructure emit CO₂

RESULT – a negligible reduction in CO₂ emissions over the lifetime of a wind farm

Subsidies

- Wind farms are only viable because of Renewable Obligation Certificates (ROCs). The consumer pays a higher price for electricity – the main beneficiaries are the shareholders of cement, wind and electricity companies and the landowners.
- Environmental economists estimate the environmental impact cost to every household in Scotland is £288 per on-shore wind farm.

Environmental aspects

- “Wind farms” should be called “Wind power stations” – they are industrializations of the natural landscape
- Scotland’s natural beauty – its attraction to tourists – is under threat with proposals for 250 wind farms
- Auchencorth Moss is close to the Pentland Hills – a Regional Park. A wind power station will destroy the view of the hills from the major tourist routes and will destroy views from the Pentlands
- Auchencorth Moss is a raised peat bog, a site of special scientific interest and a breeding ground for birds

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WIND FARMS: A REALITY CHECK.

Abstract.

Because of its intermittent character, the output from any wind turbine is unpredictable. This situation creates unique problems for electricity grids in that to avoid blackouts they must maintain conventional power stations on inefficient, high CO₂ standby to accommodate quiescent wind conditions. Thus although supposedly helping global warming, the contribution of wind turbines in reducing emissions is minimal at best. Wind generated electricity requires enormous public subsidies to survive. The environmental impact of white steel structures 300-400 feet tall, overturns any acceptable view of man-made structures in the environment. The disruption to the countryside, a resource the public is rightly concerned about, is threatened, with known damage to wildlife and medical problems for those that live nearby. Many of those who previously supported wind farms have now back-pedalled once the reality of expensive electricity and environmental damage has sunk in. (See for example comments by Professor Howard Dalton, Chief scientific adviser to DEFRA [1], Professor Jim Lovelock, green guru who opened the first wind farm in the UK and now regrets it [2], David Bellamy, broadcaster, environmentalist and botanist from Durham University [3]).

Introduction.

The following are factual data about wind farms in general and the proposal at Auchencorth Moss in particular. There is a substantial body of literature that ranges from positive hype and spin, as to be expected from wind farm companies (such as the glossy documents produced by E.ON [4]) and zealous supporters, to much negative public opposition. Present expansion of wind farms has resulted from perceptions of climate change and the present government's commitments to Kyoto protocols and EC regulations. Climate change is still scientifically a controversial area probably because any relationship between the activities of mankind and climate are not simple. However wind energy has been fastened on by governments because it is presented as free, non-polluting, reducing carbon dioxide levels in the atmosphere and reducing hazardous waste. Is this utopian presentation accurate? Carbon dioxide is identified by many as the major villain in any contribution of mankind to global warming although other gases such as methane and nitrous oxide are potentially much more influential but are produced only in smaller amounts.

Do wind farms reduce carbon dioxide production?

In Denmark, no nuclear power station or conventional power station has been closed as a result of the development of over 6,000 wind turbines [5]. If current plans are followed through there will be at least 8000 wind turbines in the UK by 2010 generating some 6-7% of total UK electricity [6].

The Oxford Institute for Energy Studies “ CO₂ Emissions Reduction: time for a reality check” [7] has reported that the two EC countries that have invested most in renewables (almost totally wind energy), Denmark and Holland, have seen their carbon dioxide emissions **increase**. France and Sweden, which have invested mainly in nuclear and hydroelectric power, are the two EC countries that have seen CO₂ emissions **maximally decrease**.

The reason for this anomaly results from the intermittent collection of wind energy dependant as it is on uncontrollable day-to-day, weather and wind variation. No electricity grid can afford to depend for its supply on variable electricity generation; otherwise electricity blackouts would result when the wind failed to blow. Such quiet periods can last days. To avoid this disastrous situation (older readers may recall the three day week in 1973), conventional power stations using fossil fuels or nuclear energy have to be constructed and kept running anywhere from 75-100% full capacity as back up to enable immediate response as public demand varies and to cover the variable wind supplies. “The paradox of building windmills is that you have to build a lot of ordinary power stations to back them up” (Dr D.Helm, DTI Energy Advisory Panel). The requirement for back up (usually using coal) necessitates keeping generators in an inefficient (high carbon dioxide-producing) condition. Increasing dependence on wind energy requires in turn increasing construction and use of conventional power stations. Thus effectively little or no carbon dioxide emission is saved. There is a constant confusion that equates renewables with reductions in carbon dioxide that is not seen in practice when the increased CO₂ emissions from back up are taken into account. At best present wind turbines may have reduced CO₂ emissions by 0.1% set in a background of increasing demand for electricity of 2%.

Denmark currently supplies 20% of its electricity from wind turbines and has now abandoned plans for any further wind farm construction [5]. The present government has determined that wind must compete on an equal footing with other energy supplies. Denmark has a very different grid system to the UK since it exports 80% of wind electricity to Norway and Sweden [8]. These two countries operate largely on hydroelectric power and can immediately accommodate Denmark’s wind-generated products by switching off their own generated electricity. No such flexibility is available to the UK. Ireland ran into extreme problems in 2003 and cancelled all further connections to wind farms for six months [5]. It then produced a new set of regulations that recognize that intermittent sources of electricity are not useful ways of reducing carbon dioxide emissions. Germany is considering removing all public subsidies from wind farms [5]. On this basis the government target of cutting carbon dioxide emissions by 20% using wind energy by 2020 looks extremely vulnerable. The dash for wind has not been properly thought through and, as wind farms continue to increase, problems will be generated in stable high pressure, low wind weather systems that frequently occur in winter.

Figures from DEFRA indicate that **on average** wind turbines are only operational 30% of the time [6]. Others claim lower figures, DTI 28% [9], Sharman only 20% [10]. The

E.ON claims of 80% operation are only true for certain times of the year. Wind speeds above 3-4 meters/second are required for turbine operation and above about 28 meters/second turbines are shut down to avoid damage. Energy production is therefore seasonal as well as hour-to-hour. The company booklet on Auchencorth Moss claims the wind turbines will provide for the electrical consumption of 22,000 houses in Midlothian. This can only occur when the wind is blowing and it is misleading not to state this obvious fact. In fact the electricity goes into the grid and does not remove any dependence on fossil fuels or nuclear energy. This electricity will be transferred to England because Scotland already produces an excess of electricity. When the efficiency of the wind turbines are taken into account this reduces to 7000 houses. A single wind turbine produces enough electricity on average to enable 350 kettles to boil.

Wind farm turbines are well over 330 feet high; 1.5 times the height of the Scott Monument. This is the equivalent of some 25-30 storey buildings (see figure 1 at end). The blocks of flats in Sighthill, or those in Kirkcaldy, visible for up to 20 miles, are a useful comparator. If the intention were to build a factory of that height on Auchencorth Moss it would instantly be denied by planning authorities.

The production of cement worldwide generates 7% of man-made carbon dioxide production [11]. The first step in cement production is the conversion of chalk to lime expelling carbon dioxide. A single turbine often requires a very large foundation hole up to 30 feet deep containing thousands of cubic feet of concrete. It clearly takes time to repay the carbon dioxide emissions arising in the construction of such enormous bases. The carbon dioxide debt will be further increased by the manufacture of the turbines themselves, the road making construction and the emissions from thousands of lorries providing transport to the site. Wind turbines have a supposed lifetime of only some 20-25 years but Danish experience puts this at 10-16 years [12].

On an hourly basis a fully operational wind turbine will save an equivalent amount of carbon dioxide to that emitted by a single articulated lorry in normal road use. Transport (particularly air transport) and industry are the major producers of carbon dioxide emission in the UK. It has been estimated that 5 jet aircraft on return flights to the USA emit equivalent CO₂ to the annual saving of carbon dioxide of one turbine. There are over 20,000 flights to the USA each year from UK airports.

According to government figures, the UK target for reduction in carbon dioxide emission by 2010 by renewables is around 2.5 million tons (the details are in the Oxford Institute study [7]). 2.5 million tons represents about one ten thousandth of global carbon dioxide emission. The Kyoto protocol calls for a reduction of one third in overall CO₂ emissions by 2020. The total UK projected reduction in carbon dioxide emissions by 2010 is some 30 million tons supposedly to come from reductions in electricity use. Most commentators agree this target will be missed.

The public subsidy provided towards a single wind turbine (see later) could instead be used to properly insulate 500 houses [6]. This would reduce electricity consumption in two years equivalent to the lifetime production of electricity by that one turbine.

Auchencorth Moss contains substantial amounts of peat. Exposure of this organic material to air leads to rapid oxidation and the production of carbon dioxide. Ploughing any field leads to a 14 fold increase in carbon dioxide production but crop growth quickly recycles the carbon dioxide during photosynthesis. No such recycling will take place with peat dumped from construction. The RSPB calculated that the wind farm in Lewis would take 25 years of operation before its carbon dioxide debt in cement and peat oxidation is finally paid [5]. It is also claimed that the Lewis wind farm will provide one fifth of Scotland's electricity. Currently this proposal is in the hands of the Scottish Executive; it has been approved by the local council. One of Scotland's few remaining areas of true wilderness will disappear if this proposal goes ahead.

Economic aspects of wind turbine electricity generation.

A single wind turbine costs about 1.3 million pounds to construct (a generous figure) and can be expected to produce, on a yearly basis, 120,000 pounds worth of electricity that is sold to the grid. On this basis the profit to the company is no different to a building society lending mortgages, at about 5% per annum. However government legislation enables wind farm companies to collect and market **Renewable Obligation Certificates (ROCs)** for electricity generated by renewables [13]. In this article it explains how £120,000 generates £265,000 pounds of ROCs, which are then sold to electricity companies (these ROC's may vary in value, just like stock market shares). By law, electricity generators have to show that a certain proportion of the electricity they sell comes from renewables or they face fines and this proportion increases annually. The electricity generators cover the costs of ROC's by increasing the price of electricity to the consumer i.e. the public. **It is the public that pays for inefficient wind-generated electricity.** The Public Accounts Committee of the HOC has estimated this year that ROC's will cost the public £ 1 Billion by 2010 and set in the context of £10.5 billion, the current value of whole sale price electricity. The main financial beneficiaries are the shareholders of cement, wind and electricity companies and landowners who charge rent for the wind turbines. It is the public that pays them and the public who pay to inflict environmental damage on the countryside in the mistaken belief that they are contributing to the amelioration of global warming. Landowners have a guaranteed no risk income of usually five or more millions paid for by everyone else including the poorest in the community. The poorest generally spend over 10% of their income on energy. It is this enormous profit that has led to a veritable gold rush of applications to build wind farms. E.ON UK, part of a larger originally German group, and formerly Powergen UK, proposes a wind farm for Auchencorth Moss. The Royal Academy of Engineering has indicated that wind energy costs 5p/KWh whilst gas fired stations cost 2.5p/KWh and 3.3p for coal fired stations (The costs of generating electricity. RAE 2004).

Although E.ON claims it publicly consults, so far as can be seen this has been limited to a small very-poorly advertised exhibition attended by 150 people out of a Penicuik population of some 20,000 (and a Midlothian population of 80,000). E.ON is Coventry based and those who plot the course of wind farm and profit expansion pay little attention to local inhabitants and the effects on their lives. As one of the presenters said “We don’t do compensation”. If a road is run through your property you receive compensation. This unfortunately at the moment seems to be the pattern of behaviour - the government have recently modified planning laws to allow wind farms companies to get their way over local objection [14].

Environmental aspects of wind farms.

Auchencorth Moss currently has a single track road with passing places - additional side roads to each turbine will have to be constructed. There is peat mining just on the Midlothian /Borders boundary. These new roads will remove substantial amounts of bog and peat. There will be large gravelled areas around each turbine and a huge foundation hole [15] see also figure 1. It is the character of peat bogs to retain heavy rainfall water and allow that water to drain slowly into the local river, the North Esk. The character of drainage may therefore change in this area making the North Esk increasingly into a spate river. During intense, often 24 hour rain, that Penicuik experiences about once a year, elevated water run-off may threaten flooding downstream particularly in the Valleyfield area of Penicuik. A proper independent hydrological study is necessary along with assessments of peak rainfall patterns over many years. E.ON has claimed that it has carried out hydrological studies but requests for the report by one of us (AT) have not been answered.

Wind farms are industrial sites, not parks as companies commonly assert. Many regard them as disfiguring the countryside that the public increasingly values for its unspoilt and natural appearance. The countryside is clearly under pressure now that car ownership is much more widespread. The public demand is for natural landscapes free of obvious industrial activities. Natural landscapes reinvigorate those who spend their working week in cities and come at weekends to enjoy the resource that Scotland offers. In surveys, 75% of those who visit the countryside say they do so because of the scenery and they are unlikely to view with equanimity attempts to destroy the green and pleasant landscape [16]. The announcement this year that the Forestry commission is to replace its larch and spruce forests with deciduous trees is one indication of the enormous importance the public now attach to natural landscape.

We quote from the Pentland Hills Regional Park web site:

“Designated an Area of Great Landscape Value for over 40 years, the intrinsic value of the Pentland Hills has been recognized and protected. The previous subject local plan

for the Hills agreed policies to ensure the landscape of the Hills was safeguarded against inappropriate development and retain local characteristics such as dry-stane dykes and vernacular farm buildings. These policies are now in the process of being incorporated into the local plans of the respective councils around the Pentlands Regional Park.

The value of the Pentlands is hard to quantify. The impact of this landscape and its juxtaposition to major centers of population will both influence the perceptions of tourists and inward investors and provide a resource to support recreation all of which influence the economy of the area.

The Regional Park through the production of its Integrated Management Strategy works with the three local authorities to further the continued integrity of this much valued much admired and much loved landscape”.

Placing enormous pillars of steel topped with large propellers is surely incompatible with the plan of the use and value of the Pentland Hills.

The recent foot and mouth epidemic indicated that tourism is far more valuable to the countryside than farming (figures suggest 8-9 fold greater). Of course agriculture affects tourism because tourists come to see pleasing agriculture as well as mountains and lochs. Tourism is Scotland's largest industry generating over four billion per year and employing over 200,000 people. Tourist boards sell Scotland's natural landscape of mountains, glens and lochs. Thus a recent TV advert shows a female car driver in a traffic jam gazing upwards with a voice saying "she's somewhere else" with the view changing to Scottish scenery. Wind farms are not included in this advert for the very good reason that they are likely to deter visitors. Estimates suggest anywhere from a 30-50% reduction in tourism to areas with wind farms [17] which agrees with estimates from countries like Denmark and Germany, but industry counters with figures suggesting only a 10% reduction. Enormous wind farms can be expected to deter the traditional visitor. Once the novelty value wears off, even day trippers will stay away. Day trippers do not bring in the tourist gains that we have enjoyed in Scotland from longer stay visitors. 250 wind farms are currently proposed for Scotland. Discussions with SNH published in 2005 indicate a possible 4-600 wind farms and figures produced by Transco of 17GW indicate well over a 1000.

The effect on tourism may depend on how close the wind farm is to the tourist area. The majority of people do not regard wind farms as countryside and do not wish, if they come from cities and towns such as Edinburgh, to be reminded of industrial might; they come for the natural contrast. A wind farm on Auchencorth Moss would increase the distance required for the 0.5 million Edinburgh citizens to escape indications of man-made changes to the natural environment.

The finest views of the Pentlands are to be obtained from the Peebles and Moffat directions and the small road across the Moss. Many tourists come in coach loads via Moffat through the Tweed valley. Passing a large wind farm with 330 foot high structures will provide a memorable experience but not one that is likely to encourage

equating Scotland's advertised naturalness with reality. Furthermore such impressions passed on to others could lead to knock-on reductions in future tourism. Wind farms are not a tourist selling point.

The Pentlands regional park is used by large numbers of Edinburgh citizens and their attitude to a wind farm so close to Edinburgh should be sought. One sensible recommendation for wind farms is that they should be placed no nearer than 10 miles to any large town or village [18]. The Auchencorth Moss proposal, which is certainly within two miles of Penicuik (the nearest turbine is only 1.42 miles away), clearly breaks this recommendation. A further recommendation is that they should occupy existing industrial sites [18]. Clearly this has been ignored again. Companies choose sites they think will maximize their return to their shareholders; they are indifferent to other considerations as indicated by their invasion of some of the most scenic sites in England.

Tourism is much more valuable to Scotland than the electricity savings to be gained from wind. Renewable obligation certificates might better be served in Scotland through increased hydroelectric power.

Economic assessments of environmental costs of wind farm construction.

J Hanley, Professor of Environmental Economics at Stirling University has recently made detailed assessments of public preferences and converted those preferences into a cost benefit analysis of on-shore and off-shore wind farms in Scotland [19]. Based on the numbers of MWatts generated, a large wind farm (over 50MW) costs every household in Scotland an average of £400, solely the result of the damaging environmental impact the public actively perceives. If 250 on-shore wind farms are constructed, as planned, the cost to every household would be substantial. To this should be added the reduction in tourism which if only 10% would cost Scotland's economy £200 million and the loss of 20,000 jobs. The electricity produced by these wind farms would merely be transferred south because Scotland has a capacity to produce 15GW, but its running average requirement is only about 6 GW. Similar environmental economic approaches were used to assess cost/benefits of a potential wind farm in Nantucket, U.S.A. Just as in Scotland the costs greatly outweighed the benefit of wind energy generation. E.ON should be requested to produce an estimate covering costs of environmental damage and loss of countryside amenity thus enabling Penicuik citizens to better judge the case for and against wind power.

If on the other hand wind companies build off-shore (3 or more miles off-shore) the public attitudes turn into a benefit of about £ 108 per wind farm although these figures do not take account of possible tourism issues. It costs an extra 25-50% to build wind farms off-shore and that explains in part the reluctance of wind companies to do it. Furthermore this extra cost eats into profits because it is a charge that cannot be passed on to the consumer. But the public preference is very clear; off-shore wind farms are strongly preferred.

Environmental Damage resulting from noise and increased traffic

For those living near wind farms two aspects seem to be critical. Firstly, noise levels generated by the turbine propeller blade cutting through the air. The noise is described as low frequency of a thwump-thwump kind and causing, in some cases, considerable discomfort, sleep problems and stress [20]. Near certain wind farms in Wales it has been shown to exceed legal limits. No compensation is offered by wind farm companies to local inhabitants although there could be a case for suing the landowner for allowing his property to be used for illegal noise production, much as night club landlords face prosecution. A further problem is the reduction in value of houses nearby. The difficulties of selling houses nearby have been reported a number of times (the latest is by the Royal Institute of Chartered Surveyors who reported that 60% of their polled members reported declines in house values) and these are the true indications of what the public thinks of wind farms. Reductions in value or outright unsaleability depend on proximity to and visibility of the turbines. A Furness couple won a legal ruling that the value of their house has been “significantly diminished” by the construction of a windfarm nearby [21]. The case was against the previous owner who had withheld information about the proposed wind farm. A Government consultant Geoff Leventhal says “The legal case in the U.K. which is often quoted, was a one-off; and possibly contained an element of reprimand of the vendor for deliberately withholding information from the buyer” [22]. If there was no effect on prices and no lack of amenity or noise impact or flickering why would the vendor have needed to mention it? This court result indicates again a significant adverse effect on house prices. In contrast the only local beneficiary is the landowner who profits at other peoples expense.

It is an irony that those who campaign to protect the environment are those most vociferous in the support of wind energy and its associated industrial modification of the countryside. It may be recalled that the dual carriageway from Glencorse to Edinburgh was prevented by agitation about environmental damage. Since it is suggested that most construction trucks will come via West Linton, there should be attempts to gauge West Linton residents’ opinions to the years of disruption expected from heavy lorry transport.

Finally there will be disturbance to bird populations. There is certainly concern over wading birds and the effects on a curlew population that a changed environment would bring. The extremities of the turbine blade rotate at over 100 miles per hour and bird collisions are reported to occur anything from five collisions per day to only 40 per year. Migrating geese that pass over Penicuik in autumn and spring time may be particularly vulnerable. It has been estimated that worldwide, current wind machines kill 11,000 birds of prey, 350,000 bats and 3 million small birds [5]. Despite claims by E.ON in their glossy document, no contact has been established with the R.S.P.B. according to the R.S.P.B. office in Selkirk that covers the Midlothian area (telephone conversation with Peter Gordon, their local officer). According to a conversation with David Gray, from Scottish Natural Heritage in Dalkeith, there has been no contact since they saw the initial plan about two years ago. Auchencorth moss is also a raised peat bog containing a

number of rare species of lower plants and is an SSSI as a consequence (listed in SNH as such).

Efficiency of wind electricity production.

A single conventional power plant produces electricity equivalent to 1000 wind turbines. 250 wind farms (at least) are proposed for Scotland that will cover about 500 square miles in total. The area occupied by an equivalent number of conventional power stations, 5 in total, would be at most about 0.5 square miles. The DRAX power station in Yorkshire generates more electricity than all current UK wind turbines. The two nuclear power stations in Scotland provide for 40% of its electricity consumption and occupy less than 0.1 square miles each.

The current largest wind farm found in Wales is 159 turbines and occupies many thousands of acres. On a yearly basis it produces less than four days output from a conventional power station.

Scotland experiences higher and more consistent winds than much of England and thus has more potential wind power. Scotland already sells about 30% of its generated energy to England. We don't know if this energy is used wisely or wastefully. There seems to be no agitation about this export, as occurred some while back with the use of oil derived off Scotland's coasts. Wind electricity generation has been put forward on the basis of marginally relieving aspects of climate change, not as an economic export.

Currently there seems to be little projection of what will happen to wind power as the climate changes. But if predictions of increased storms are correct, then wind generators will be switched off for longer periods of time than currently envisaged.

Turbines actually use some of their electricity to operate pumps that control the blade angles, the oil heaters lights, wind sensors and so on. Estimates indicate this may consume up to 50% of electricity generated [23].

Conclusions.

Because of its intermittent character, wind generated electricity is not a useful method of power generation for a public that needs electricity 24 hours per day. Increasing construction of wind farms will require more conventional power stations using fossil fuels, thus obviating the supposed reason for its introduction, which is to reduce carbon dioxide emissions. Wind farms do not close nuclear or conventional power stations and greater dependence on wind will necessitate the further growth of conventional and nuclear power stations operating inefficiently to act as back-ups. If, as we suspect, there is little or no justification for more electricity generation in Scotland, then wind generated electricity merely acts as an excess production to be sold off elsewhere or the wind

turbines are simply shut down. Merchant ships no longer use sail nor do airlines use hot air balloons because the major drawback of wind power is that it is intermittent.

If the benefits are negligible, the costs are enormous. The spatial footprint of wind farms compared to conventional power stations is massive. The public needs to decide, and be allowed to decide, the balance they see necessary between different kinds of energy supply. There are many reports on the web of local communities being denied inputs into decisions and of planning decisions being subverted by government intervention largely as a result of appeals by wind companies. Wind farms only survive because of enormous subsidies paid for by the public who thus invest in the industrialization and many would say the destruction of one of the most valuable resources in the UK; its few remaining areas of unspoilt countryside that are found predominantly in Scotland. An economic value needs to be placed on an unspoilt countryside and then added to the cost of wind generated electricity. Better still would be the removal of public subsidies via ROC's as is now being considered in Germany.

Despite the enormous spatial foot print, saving of CO₂ production will be minimal (a reduction of 0.1%) and this has led to a common theme on the web that government policy in this regard is token politics, and spin. Enormous structures convince the public that something is being done even though there is no relationship between the size of the structure and its effect on global warming. House insulation, more efficient transport, hybrid electrical petrol cars would all contribute much more to emissions savings but do not have the same visual effect.

Flue-scrubbed conventional power stations, which remove carbon dioxide, operate in about a dozen countries around the world with the CO₂ being stored in disused oil fields. The UK government has been slow to take advantage of such stations despite having enormous depleted oil fields in which carbon dioxide can be stored. Expansion of this kind of power station is surely more beneficial than current renewable policy.

There are reserves of oil for about 50 years [20] at current use, uranium for 100 years, natural gas several centuries and coal several millennia. It is believed that there are enormous deposits of methane hydrates on the bottom of the ocean that may provide a temporary solution to a rapidly developing world until hopefully fusion will be the generator of choice in the future.

Scotland's obligation under Kyoto is to produce 18% of its electricity consumption by renewables by 2010. Scotland uses about 6 GW on an annual average basis and 0.72 GW is hydroelectric power. On that basis 18% is reached with about 300 wind turbines (approximately 8 wind farms of the proposed Auchencorth Moss size). There are already 30 wind farms operating in Scotland and a further 20-40 under construction and the intention of many more.

But the Scottish executive does not make clear that renewables do not equate to carbon dioxide emissions. It has become a target without obvious relevance to Kyoto.

Personal View of the present Auchencorth Moss proposal by E.ON

Wind is a useful source of energy but the limitations of intermittency, environmental damage and minimal effect on carbon dioxide emissions make wind power stations inappropriate to future energy requirements. Wind turbines can most usefully be employed locally (micro-generation) for small communities which can easily use the National Grid as back up. But currently it is difficult for such communities to either invest in wind turbines or to connect them to the National Grid if they have excess. Similar problems apply to photovoltaic cells and even tidal energy. Thus the most useful form of renewable energy as a local source is under-invested. The problem with current wind energy proposals is that large profits can be gained by companies but at a price that would be unacceptable in straight market conditions. Unfortunately the profits to be gained, lead wind energy companies in particular to provide information which omits facts necessary for the public to make a reasoned judgement concerning its real value. We have tried to correct that situation with the facts above.

The colour brochure published by E.ON contains the statement “everyone benefits”. This is patently untrue! Shareholders and the landowner benefit but it is the public that pays for their increased profits through higher electricity prices. Ironically the public also pays for the disfigurement of the environment. The supposed benefits for global warming are currently tiny compared with the environmental damage. Something that should be free to all of us, a beautiful and natural landscape of farms with the backdrop of the Pentland Hills will be denied to all of us if E.ON gets its way.

For those that live near the intended site the future is much more threatening. It is very difficult to envisage something 300 feet high or to imagine the noise that wind turbines generate or the years of mess and traffic disruption. People can easily be deceived by companies, and wind companies are no different to others in this regard, that simply place spin above fact. The glossy document “Why Wind?” is little more than advertising and no more believable than a particular washing powder washes whiter. Its claimed factual basis, usually relying on carefully selected facts, is contradicted by much of what is placed above.

For example “Why Wind?” [24] claims wind electricity is no more expensive than other forms of energy. In that case perhaps wind companies should give away the money gained from ROC’s to charity and see what profits are then gained. Without ROC’s, i.e. public subsidies paid for by higher electricity prices, no wind farms would currently be constructed or used. The wholesale price of electricity is currently between 1.5 and 2 pence /kWh. Wind electricity commands 5.4 p/kWh although there is some variation on a year-by-year basis. As the detailed economic study in Nantucket Sound showed, the costs far outweigh the benefits. Only the public subsidizing their construction and use leads to the construction of any wind farms. “Why Wind?” also claims that wind could produce all of the UK’s electricity but doesn’t mention what it would do when the wind stopped blowing. We would all sit and twiddle our fingers to keep warm in the cold and dark. Furthermore to generate the 43GW of electricity that is the average demand in the

UK would require at least 100,000 turbines. It has been calculated that if these were placed off-shore, a coastal strip 10km wide encircling the entire coastline of the British isles would be occupied. If on-shore an area of land larger than the size of Wales would be covered in concrete and turbines. “Why wind” [24] mentions neither requirement. Nor does it refer to the grid instability such a situation would incur.

If the continued lack of interest in local amenities in Penicuik centre continues, an industrial wind farm site on the South will strongly reduce any desirable reason for living in a town on the edge of countryside. We expect house prices either to decline or not to increase as they would have done had the wind farm not been built. The Pentland Hills themselves are a unique resource enabling easy access for many thousands who come from Edinburgh and elsewhere to enjoy the pleasure only a natural countryside can bring. For those that think wind farms are not a problem they should go up the A68 past Fala to the Duns wind farm and see how they feel at having these structures at their back door. The turbines proposed for Auchencorth are substantially bigger.

Walkers, runners and cyclists frequent the Auchencorth Moss road. Few vehicles use it because it is narrow and the notable features are the extreme quietness and the calls of curlews. It provides one of the finest of views of the Pentland Hills. But many other areas that look onto the Moss will now have their view of the countryside damaged, especially the southern view of the Moorfoot Hills. A wind farm is a permanent alteration to the landscape for 20-25 years minimum and there is nothing to stop further extensions once the company receives the go ahead. It is notable that the company initially claims that only 45 Mwatts will be generated, just 5 Mwatts below the figure which requires Scottish Executive approval. An extension would then easily gain further approval. No indication has been given as to the route for the pylons that would be needed to connect the wind farm to the National Grid. Indeed since the wind farm and the pylons used for extraction are linked and both affect the appearance of the landscape, they should not be considered as separate applications (as seems to be the usual case) but should be presented together at the initial planning stage.

Companies claim that there could be employment benefits for Penicuik, but experience in England suggests that labour comes with the company. When the wind farm is finished only one or two jobs involving specialized maintenance remain.

A detailed document dealing with the severe problems wind generation has for electricity companies is published by the Renewable Energy Foundation accessed via www.countryguardian.net and written by David White, an engineer.

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