

RENEWABLE ENERGY

the case for a balanced approach



The beautiful countryside of South West Scotland

Increasingly, Scotland is being transformed into an industrial wasteland by ill-considered and thoughtless wind farm developments which provide little benefit to local residents



Scotland's energy policy needs to be re-examined

Renewable Energy – the case for a balanced approach

Introduction

It is generally accepted that climate change is of major concern to many people and, during the 2019 United Kingdom General Election it has certainly been a significant topic for discussion. There seems to be a perception that existing “renewables” are the panacea to all society’s climate change concerns and, in particular, that industrial size wind turbines provide the perfect solution which will, of itself, solve the problem.

Unfortunately, politicians have seized upon this with the same enthusiasm which, only a few years ago, surrounded diesel cars. Hailed for more than 20 years as environmentally more friendly than petrol, exhortations to change to diesel power reached a crescendo before the truth that diesel was even more damaging than petrol was revealed and, within a few short months, government policy was completely reversed. Nobody, of course, admitted to making mistakes and nobody will confess to supporting the fallacy of green energy from wind turbines when the truth eventually emerges.

Scotland's first fully commercial onshore wind farm, Hagshaw Hill in South Lanarkshire, was online on November 1st 1995. A total of 26 turbines were erected with each one rated at zero point six megawatts, (just over half a megawatt) and the total wind farm output was therefore a mere 15.6 megawatts.

The Bonus B600 turbine deployed at this development had a maximum specified tower height of 58 metres and a blade length of 22 metres resulting in a tip height up to 80 metres.

From these small beginnings the onshore “wind industry” in Scotland has grown.

In 2010 there were records of just over 90 wind farms, turbine ratings increased from the above quoted 0.6 megawatts and initially no taller than 80 metres to blade tip with 44 metre diameter rotors.

During the initial 15 years from 1995 to 2010 sizes increased to 2.5 megawatts power and 120 metres height to blade tip, with 80 metre diameter rotors.

Now, almost a further 10 years on, wind farm applications are being proposed for turbines as tall as 200 metres and rotor diameters of 150 metres. In keeping with most rapid technological development, governmental and regulatory understanding has failed to keep pace and regulations are completely out of date.

This pamphlet seeks to explore some of the myths and, quite frankly, lies and spin currently in the media and to compare this with an objective consideration of the benefits and costs. It will also draw on the experiences of wind farm neighbours, because, by and large, wind farms are an “out of sight, out of mind” development for the vast majority of the population. Few members of the general population of Scotland have had the opportunity to understand the true financial cost of wind farms but there is also a substantial loss of amenity which is, similarly, not always understood. There are many people with experience of nearby wind farms who do not see them as a positive.

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Fundamental misunderstandings

Fundamental misunderstanding of the problem

The Scottish Government has expressed the intention that Scotland should produce zero carbon emissions by 2045 having identified, what is referred to as, ‘a climate emergency’. Before we examine that policy, we need to consider the source of carbon emissions. Carbon emissions are a result of the consumption of energy. This begs the question “what is energy”?

The term ‘energy’ is often confused by politicians and the media along with such expressions as ‘power’, ‘renewables’ and ‘green’. Energy is often assumed to mean electricity but actually there are three main forms of energy consumption and any serious analysis must distinguish between them.

Energy consumption in Scotland comprises energy for heating, energy for transport and electricity. Consumption of electricity is very much the smallest element; the major consumers of energy are transport and heating.

Energy for Heating.

The majority of homes in Scotland are heated by gas which costs around one third of the equivalent amount for electricity. They were mostly built a long time ago, are poorly insulated and heated by old and inefficient boilers. Even the most up to date constructions are subject to very low standards of insulation, frequently without even obvious savings such as solar panels. The likelihood of converting gas heating to electric in the foreseeable future is extremely small.

The two most effective contributions which could be made to the reduction of carbon emissions in the short term would be substantial investment in buildings insulation and changing old, inefficient gas boilers for new, efficient heating systems.

Energy for Transport.

In recent years the prospect of electricity replacing fossil fuel to power cars, buses and trucks has moved from science fiction to become a reality and, with future development and the associated reduction of prices this change will, over time, provide significant reductions in carbon emissions from this source. It is vital, however, that the production of this electricity is done in a sensible way so that there is power available at reasonable cost to charge the vehicles. Logically this makes sense in that charging will likely take place overnight when other forms of electrical demand are generally lower.

Electricity Consumption.

Wind farms produce electrical energy, usually called power. When the Scottish Government talks about powering homes from wind, they simply mean providing the electricity used for lighting, TVs, computers and other electrical equipment. Electrical consumption is, at present, a very small element of total energy consumption. Most energy used in Scottish homes is gas and it is used for heating. The fanatical concentration on electricity production from wind which we have seen over recent years reflects the fundamental lack of understanding by government of the real problem.

Fundamental misunderstandings surrounding the production of electricity from wind.

There are many misunderstandings and a considerable amount of misleading information surrounding the production of electricity from wind and, in particular, the selection of Scotland as the location of choice for wind farm developers around the world. There is talk of better wind, blowing more reliably, suggestions that the wind is always blowing somewhere, so the way forward is to build more wind farms to take advantage of this. In reality, all wind energy is intermittent and unreliable, wherever it is. Wind doesn't blow all the time and if the wind stops blowing in Ayrshire, none of the wind turbines in Ayrshire will be producing electricity.

Wind farm planning applications usually include the claim that the proposed wind farm will provide power for (say) 50,000 homes and this is a confusing statistic. Firstly, homes and businesses in Scotland do not benefit from the production because most of it is exported. Secondly, most energy used in Scotland simply does not come from electricity.

Despite the claim that there are no negative effects from wind farm developments, there are, quite clearly, a number of problems associated with the industry. The Scottish Government's obsessive desire to increase the number of wind turbines is damaging the environment and will not provide a reliable and secure supply of energy to Scottish homes.

It is more than ironic that the very steps being taken in the name of protecting the planet from a climate change emergency are, in fact, speeding up environmental damage. The recent report into decline of wildlife highlighted that more damage was occurring in Scotland than in the rest of the United Kingdom.

The reason why wind farm companies currently see Scotland as their location of choice is very simple. Subsidies for generating electricity from wind are far higher in Scotland than anywhere else in the world. Successive governments and, of course, wind farm developers have consistently lied to the people of Scotland (and to some extent also the rest of the UK) in order to hide the true cost of 'green' energy. That cost is not just financial, but finance is a good place to start.

Fundamental misunderstanding of the financial situation.

Each year, every household in Scotland contributes approximately £330 to renewable subsidies, most of which relates to wind.

Direct impact of renewables subsidies on household electricity bills is about £130 a year. The costs of these subsidies on businesses and the public sector must also be passed on to consumers amounting to a further £200 a year per household. These figures do not include each consumer's share of the "constraints" payments which are paid to wind farms – over £135 million in 2019. Constraints" payments are paid when the electricity grid can't use the power which would have been produced and they are more than the value of the electricity not used.

For example, on 3 June 2019, Arecleoch Wind Farm was paid £95,166.00 to constrain 1,360.01 MWh of energy. Arecleoch, Kilgallioch and Mark Hill, all wind farms, owned by Scottish Power Renewables and currently operational in Barrhill, have been paid £39,062,758.00 in total to constrain around 599,374 MWh of electricity.

Source: Renewable Energy Foundation (figures up to 26 August 2019).

Constraints payments mean that wind farms make money even when switched off, in fact the wind farm companies make more money when turbines are switched off than when they are working by virtue of the bizarre calculation system.

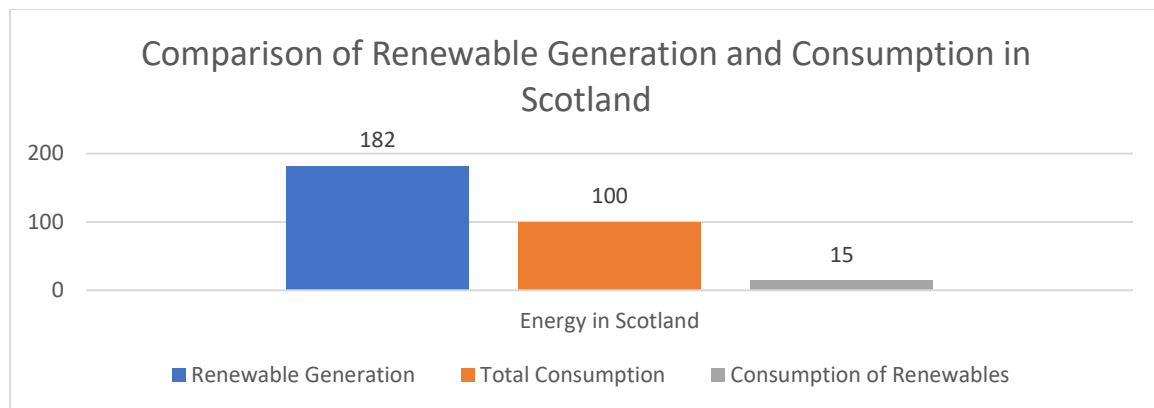
What makes all this difficult to comprehend is that the subsidies take a number of forms and are not easily drawn out from official statistics.

Source: Office for Budget Responsibility's Economic and Fiscal Outlook, March 2019 and The Global Warming Policy Forum and The Renewable Energy Foundation

If it were merely a matter of subsidy and the result was that Scotland enjoyed the use of substantially all the subsidised energy at a low price, it might be considered an acceptable compromise. After all, the more electricity you use, the more subsidy you pay (up to a point). In fact, however, Scotland does not receive the benefit of subsidised electricity, most of it goes elsewhere. Most of this electricity, subsidised to the tune of £330 by each and every Scottish and UK household is exported and sold overseas at full market value, providing massive profits for the wind farm companies.

Whilst, in the first six months of 2019, wind generation in Scotland accounted for almost twice the electricity actually consumed, the amount of renewable energy supplied to Scottish electricity customers who have not opted exclusively for a renewables tariff is very small. In 2016/17 it was 28%, in 2017/18 only 15% with a tiny rise in 2018/19 to 18%.

This is a heinous crime against the people of Scotland. In the guise of a 'climate change emergency'. Nothing has been learned from the Biomass fiasco.



There are no restrictions on the use of the subsidised energy, and it is much more profitable for wind farm companies to sell electricity in Europe, Ireland and England, where they receive the full open market price. Most electricity from industrial wind farms doesn't even join the ancient and creaking National Grid, it is transferred immediately out of Scotland through the interconnector system. Scotland receives no benefit from this subsidised energy for which we all pay handsomely.

The electricity actually used in Scotland is derived 85% from Coal, Nuclear and Gas and only 15% from renewables.

Source: Earth Energy Report and Scottish Power Electricity Bills.

The Increase in Prices and Fuel Poverty.

As noted above, if it were merely a matter of subsidy and the result was that Scotland enjoyed the use of substantially all the subsidised energy at a low price, it might be considered an acceptable compromise. It doesn't work like that.

Since 2008, electricity prices in Scotland have risen by 41%. The average electricity bill in 2008 was £477 per year, in 2018 it was £672. Now, clearly, all prices have been subject to inflation during a ten-year period and, thanks to austerity and other government policies, wages did not rise by anything like that.

Source: Quarterly Energy Prices, BEIS, March 2019.

24.9% of Scottish households now live in fuel poverty, 7% in extreme fuel poverty.

(Extreme fuel poverty is when more than 20% of the household income is expended on domestic fuel.) In 2003 there were 16% in fuel poverty and 5.1% in extreme fuel poverty. The situation is getting worse, not better.

In 2012 the Scottish Government pledged to eradicate fuel poverty by 2016, clearly that has not happened. As fuel poverty has increased less has been heard of attempts to eradicate it but the latest 'pledge' is that no more than 5% of Scottish households will be in fuel poverty by 2040 and no more than 1% will live in extreme fuel poverty by that date! What that means is that, for the next 20 years, people with an annual income that no one could live on will contribute £340 each year to subsidise the profits of wind farm companies! Robin Hood supposedly robbed from the rich to give to the poor, this is different. Maybe saving the planet doesn't seem quite so important if you are freezing cold and starving to death?

Source: Scottish House Condition Survey.

Profits for the Wind Farm Companies.

Every turbine generates up to £20 million for the wind farm developer over its lifetime. Every single turbine. Consider that alongside the obscene levels of declared profits of these wind farm companies who are often based overseas and it makes no sense.

The tiny contributions made to community projects pales into insignificance when compared to the huge profits made by wind farm developers.

In Summary.

The development of expensive, environmentally damaging and heavily subsidised industrial scale wind farms to provide for the smallest element of energy consumption shows a complete lack of understanding of the situation. It may well be true that there is a climate change emergency but concentrating on resolving a small part of the problem regardless of cost or the many negative aspects of wind farm development is not a sensible policy. The Scottish Government needs to adopt a cohesive strategy to address the whole problem and not merely concentrate on one part of the solution.

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A discussion of some of the negative aspects of Wind Farms which are not normally publicised

Wind Turbine Noise - The New Highland Clearances.

Families were driven from the Highlands in the 18th century to make way for sheep during the infamous Highland Clearances. All over Scotland rural areas are now being devastated by ill-conceived and badly sited wind farms. Many of these developments are situated in the South West.

There are many studies which indicate extreme health problems associated with wind farms including the respected World Health Organisation. The Scottish Government continues to ignore this evidence as do governments elsewhere. It simply isn't good politics to tell the truth about wind power.

<https://www.wind-watch.org/documents/case-studies-that-have-convinced-me-that-industrial-wind-turbines-make-people-sick/>

<http://www.windsofjustice.org.uk/2019/12/wind-turbine-noise-and-understanding-the-spectrum-of-noise-infrasound-and-low-frequency-noise-ilfn-and-why-etsu-r-97-is-unfit-for-purpose/>

South Ayrshire Council and Dumfries and Galloway Council (to name but two) have received many noise complaints from residents living in close proximity to wind turbine developments including Arecleoch, Markhill and Kilgallioch and these have risen substantially as more operational turbines are deployed. This is a significant issue which is causing even greater concern, as the current renewable energy policy is driving development of larger scale wind farms, like Arecleoch Extension, with turbines of even greater size and capacity closer to homes. As mentioned in the introduction, onshore wind turbine sizes have increased from under 50m to up to 200m, and power output from under 1MW to 3-4 MW, without any notable review of wind turbine noise impacts. Scoop Hill community wind farm, South East of Moffat is currently being proposed with 80 turbines up to 240mtrs high.

ETSU 97 which is the regulation relevant to wind farm development is an outdated planning condition, introduced in 1997 when turbines were smaller, quieter and less powerful. It is unfit for purpose and does not protect people, farm animals or wildlife from the full spectrum of noise pollution. It does not provide safe conditions for windfarm neighbours. Loss of amenity through noise pollution suffered by affected people including children, living in close proximity to industrial wind turbines is a cause of misery and deteriorating health.

This video <https://www.zdf.de/dokumentation/planet-e/infrasound-100.html> will help you to understand what is happening to those 'forced' to live in this manner. It is from the ZDF (Second German Television Channel) science programme "planet earth" on infrasound.

The World Health Organisation noise guidelines 2018 provide a means to protect affected residents from potential harm. Current wind turbine noise guidance only covers ETSU 97 - volume of sound emitted and not the character, the frequency, and the impulsive, cyclical nature of the acoustic emissions. The regulations are inadequate as the new World Health Organisation noise guidelines illustrate because they fail to include infrasound, low frequencies and high frequencies.

Noise complaints from wind turbines are a growing problem and Councils in Scotland are failing to adequately protect affected residents. The policy of asking the perpetrator such as Scottish Power Renewables to monitor and produce results of noise pollution testing is failing the victims who are subjected to that noise pollution. They are fobbed off with noise reports which are selective, fail to take account of cumulative effects and are not fit for

purpose. Homes have been abandoned near Hadyard Hill and many people are living in unsellable homes, in torturous conditions, with ruined amenity and damaged health.

The Finnish Association for Environmental Health, SYTe, started measuring infrasound from wind turbines at seven different locations in Finland in the first half of 2019. According to the results from May–June the infrasound from wind turbines can be measured at a distance of at least 30-60 km from the wind farms. In Satakunta, Southern and Northern Ostrobothnia, there is infrasound from wind turbines on about half of the measurement days or even almost daily. <https://syte.fi/2019/08/03/infrasound-from-wind-turbines-is-detected-in-a-distance-of-40-60-km-from-wind-parks-during-more-than-50-of-the-measurement-days/>

A number of advances in research and evidence with regard to wind turbine noise have been recognised by the World Health Organisation who published its latest Noise Guidelines in October 2018. It is essential that this guidance is incorporated into Scottish procedure.

[*WHO European noise-guidelines-10-10-2018*](#)

Habitat Loss.

Planning applications for wind farm developments are always accompanied by ‘environmental impact assessments’ extending to many thousands of pages, based upon ‘desktop studies’, wildlife surveys and providing ‘deer management plans’ and other purported safeguards supposedly to protect the area from potential habitat loss. It is impossible for anyone to examine the huge volume of information provided in the period between the submission of the planning application and the deadline for objections to be lodged.

The construction of wind farms on agricultural land, upland pasture, moorland or forest can only be considered to be a 100% destruction of the area’s habitat. The original habitat is quiet, remote, subject to only very occasional disturbance, almost never by vehicles and this is transformed overnight into an industrial construction site. Animals and birds which have never experienced the noise and vibration of construction traffic either move away or are killed. Once the wind farm is completed, the continued noise and vibration means they never return.

Studies in the USA and Spain have shown the huge cost in terms of bird deaths whilst, in the UK, information has been suppressed because access to wind farms is not permitted.

<https://www.thegwpf.com/rspb-killing-windfarms-accused-destroying-rare-birds/>

Post-construction surveys have been carried out by wind farm developers for many years but few of the surveys, if any, ever reach the public domain. Not only is this information hidden from local residents but it is not even shared within the industry itself. Consequently, we have no way of knowing the true extent of environmental damage or if the much lauded ‘mitigation measures’ are actually effective.

As recently as October 2019, the Mail on Sunday reported that Scottish National Heritage was concerned about the effect of giant turbines on bird populations and one only has to look online to find endless reports about this.

Recent trends in wind farm construction extend the areas devastated by them further and further into wild land areas, remote and unspoilt parts of the country where tourists are known to visit because of the peace and tranquillity. The recent UK Staycation awards cited Dumfries and Galloway as ‘Location of the Year’ due to Breath-taking Scenery, A Stunning Coastline and the Dark Skies. Wind farms remove all these advantages from an industry we desperately need.

In upland areas where there are deep deposits of peat, the construction of wind farms releases carbon stored since the last ice age, destroys fish spawning areas and private water supplies. (See further notes)

Water Contamination.

Rural dwellers rely on their private water supplies and usually have no alternative. Private water supplies are more vulnerable to contamination and pollution than public water supplies because they are, by nature, a local source without the safeguards and monitoring to which public supplies are subject. It should not be the case in 21st Century Scotland that our citizens have to fight for the right to protect and maintain their water supplies in a clean and wholesome condition and yet it is.

The Scottish Environmental Protection Agency has been presented with many Requests for Action in relation to water contamination and windfarm development, Sneddon's Law in East Ayrshire and Blackcraig windfarm in Dumfries and Galloway being examples which identify all the concerns of private water supply pollution. The present planning system allows wind farm companies to perform their own assessment, frequently nothing more than a 'desk top study', which invariably conclude that the development will not cause a problem. Unless a full independent Geohydrology report is made standard practice in wind farm applications with all the correct monitoring, then citizens will continue to become ill as the water environment continues to become contaminated.

Water is a basic human right and a requirement for life. There have been several successful human rights cases based on pollution of private water supplies in Europe, not just because of pollution by commercial developers but also due to pollution by local authorities. This is a live issue wherever industrialisation takes place. The contamination of surface and ground water caused by leakage and spills of chemicals from vehicle use has been identified as one problem and groundwater contamination from concrete pouring for turbine foundations within excavated areas is another.

The potential for erosion and sedimentation pollution into surrounding watercourses during construction occurs during rainfall on exposed ground, borrow pit excavation (a euphemism for an enormous hole in the ground) and ground disturbance in the proximity of emergent springs can also cause a deterioration surface water quality.

The diagram on the next page shows how water becomes contaminated.

Construction impacts on Groundwater

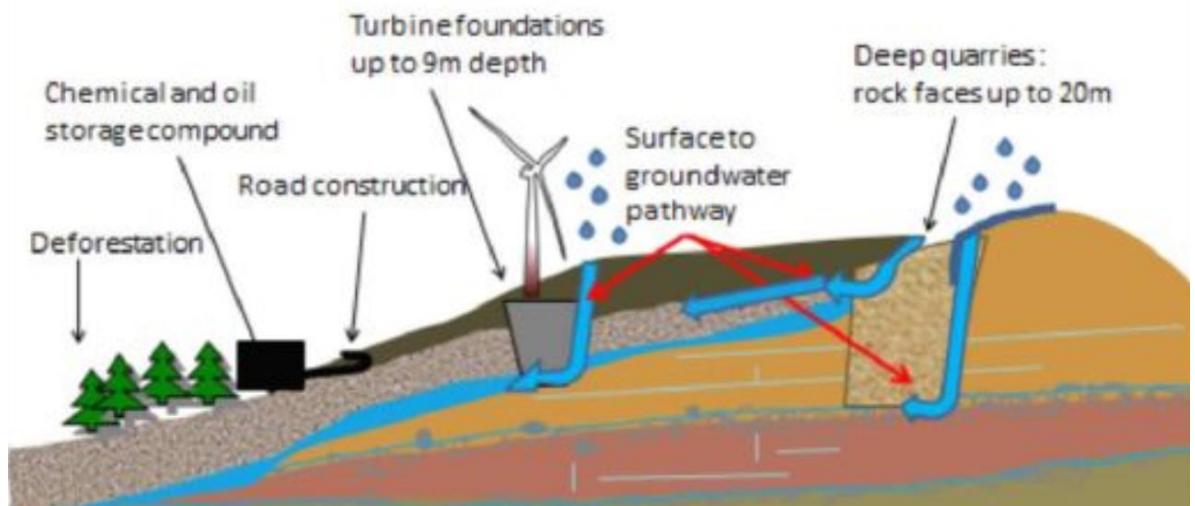


Diagram by Dr Rachel Connor

Fault lines (cracks caused by fracturing such as earthquakes) and dykes (caused by an igneous intrusion from the centre of the earth) are dominant in much of Scotland. They can have an important impact on the aquifer allowing water to flow in a different direction to the topography. This means that without extensive borehole testing there is no way of knowing the relationship between dykes/fault lines and aquifers and thus, where the water supply actually originates.

Wind farm development applications are riddled with developer's jargon. 'Good practice', 'professional judgement', 'desktop studies' and 'experience from other relevant projects' is doublespeak used frequently by developers in planning applications and does NOT provide factual information. It is unacceptable that the developer can be allowed to submit an Environmental Statement which is so deficient in scientific fact when the very basic requirements of life can be affected?

The relevant legislation is European the Water Frameworks Directive.

The stated major risks of affecting water quality are defined as not only risks to public health by virtue of contaminating water, but risks to the welfare of farm animals and wildlife, which is dependent on clean water. If water supplies are affected, it will be because groundwater is either contaminated or groundwater flows have been altered by quarrying or construction. These effects are likely to last months and may be permanent. Such changes are contrary to the Water Framework Directive which is transposed into Scottish Law.

Once again regulations and legislation is not fit for purpose especially in the light of the fanatical scramble for more profit by wind farm companies.

Notes on Peat.

Where wind farms are constructed in upland areas, the installation of turbines, roads and the other infrastructure required to support them will usually fatally damage the peat through extraction, drainage and drying. Scottish peatlands are vital in climate change mitigation, acting as a sink for greenhouse gases, supporting biodiversity and regulating water quality and flow. While peatlands cover only 3% of the world's land area, they contain nearly 30% of all carbon stored on land. Campaigners and experts warn that damage to the peatlands could be irreversible with degraded peat losing the ability to absorb carbon and potentially releasing thousands of tonnes back into the atmosphere.

Expert, Richard Lindsay, head of environmental and conservation research the University of East London said: "There is a delicious irony in the fact that we build wind farms to reduce our carbon emissions, but some of the best places to build wind farms are peatlands, which are our biggest carbon store. The simple fact is that just 30 centimetres of peat over one hectare contains the same amount of carbon as one hectare of tropical rainforest – around 280 tonnes. They have been capturing and storing carbon for up to 8000 years so when you damage them, you release this long-term carbon store."

The proposed Clauchrie wind farm will require an estimated 28 kilometres of road to be constructed which, at 6 metres wide will mean some 4,700 tonnes of carbon released if only 30 centimetres of peat is excavated. In reality the excavations will be much deeper than that.

Notes on Forestry and Public Land.

It must be the biggest and most serious **conflict of interest** imaginable that the Scottish Government, via Energy Consents Scotland, approves, without any checks and balances, applications for wind farms on its own land from which it will receive financial benefit. This is frequently against the wishes of affected residents, local Councils and Community Councils whose views are, frankly, disregarded. Such areas include land owned by Forest and Land Scotland (formerly the Forestry Commission) and Scottish Water, land which actually belongs to the public, the taxpayer.

One of the aspects of local advantage highlighted by the UK Staycation report was 'Dark Skies'. The Galloway Dark Sky Park is operated by Forest and Land Scotland which cannot be an independent objector to windfarm applications as it also gains financial benefit from the rent of the land to industrial windfarm developments. Note, however, that the latest turbines at some 200 metres tall require lighting to comply with aviation regulations so the Dark Sky Park will become a thing of the past.

It may be thought that the Galloway and South Ayrshire UNESCO Biosphere partnership might object but they are partly funded by Forest and Land Scotland and so, cannot.

Nisbet (2001) stated that the major water quality concerns associated with commercial forestry are increased turbidity and sedimentation due to the soil disturbance accompanying cultivation, drainage, road construction and harvesting operations; and the enhanced capture of acid deposition by forest canopies resulting in further acidification of surface waters. The deforestation in preparation for windfarms is clearly linked with increased carbon concentrations in surface and ground water.

Another aspect which is usually ignored is the loss of public amenity. The public are not encouraged to wander unsupervised within wind farms and, where these are constructed

on public land, they frequently mean the closure of footpaths and other rights of way in contravention of 'right to roam' legislation.

Notes on the Construction of Wind Turbines themselves.

It is popular to assume that wind turbines are innocuous, they are imagined to be silent and we frequently see pictures on television of happy children lying at the foot of wind turbines gazing at the clear blue sky and contemplating the future of the planet in the brave new 'green' world. It is to be hoped that filming this footage didn't take too long as they are in grave danger from two potential killers, Neodymium and SF6. In this brave new world, we assume, everything will be recyclable, except the turbines, of course.

Neodymium is a chemical element with the symbol Nd and atomic number 60. Neodymium belongs to the lanthanide series and is a rare-earth element. It is a hard, slightly malleable silvery metal, that quickly tarnishes in air and moisture. It is present in significant quantities in the ore minerals monazite and bastnäsite. Although neodymium is classed as a rare-earth element, it is fairly common, no rarer than cobalt, nickel, or copper, and is widely distributed in the Earth's crust. Neodymium is not found naturally in metallic form or unmixed with other lanthanides, and it is usually refined for general use.

BUT most of the world's commercial neodymium is mined in Inner and Outer Mongolia and processed in China. The process of mining and extraction is extremely toxic and damaging to the environment and no other country will permit the pollution the process causes.

One important use of neodymium is as a component in the alloys used to make high-strength neodymium magnets—powerful permanent magnets. These magnets are widely used in such products as microphones, professional loudspeakers, in-ear headphones, high performance hobby DC electric motors, and computer hard disks, where low magnet mass (or volume) or strong magnetic fields are required. Larger neodymium magnets are used in high-power-versus-weight electric motors (for example in hybrid cars) and generators in aircraft. Significant quantities are used in wind turbine electric generators. (Up to two tonnes per turbine.)

The main problem with neodymium is the toxicity of the manufacturing process.

<https://www.dailymail.co.uk/home/moslive/article-1350811/In-China-true-cost-Britains-clean-green-wind-power-experiment-Pollution-disastrous-scale.html>

<https://www.theguardian.com/environment/2012/aug/07/china-rare-earth-village-pollution>

There are also health effects of neodymium. The amount of neodymium in humans is quite small and, although the metal has no biological role, it can have effects on parts of the body: neodymium dust and salts are very irritating to the eyes. Neodymium is, however, mostly dangerous in the working environment, due to the fact that fumes and gasses can be inhaled with air. This can cause lung embolisms, especially during long-term exposure. Neodymium can be a threat to the liver when it accumulates in the human body.

In addition, there are environmental effects of neodymium. Neodymium is dumped in the environment in many different places, mainly by petrol-producing industries. It can also enter the environment when household equipment is thrown away. Neodymium will gradually accumulate in soils and water and this will eventually lead to increasing concentrations in humans, animals and soil particles. With water-animals neodymium causes damage to cell membranes, which has several negative influences on reproduction and on the functions of the nervous system.

<https://www.lenntech.com/periodic/elements/nd.htm>

SF6, more correctly known as Sulphur Hexafluoride is a colourless, odourless, non-flammable compound with high chemical stability. It is poorly soluble in water and is five times heavier than air. It is used in many types of electrical switch gear to safeguard against arcing at high load factors. It is also used in wind turbines. Each individual wind turbine has 4 separate switches each with its own supply of SF6 gas.

<https://www.bbc.co.uk/news/science-environment-49567197>

SF6 is also one of the most damaging greenhouse gas elements known, being some 23,500 times more damaging than CO2. Just one kilogram of SF6 warms the Earth to the same extent as 24 people flying London to New York return. It also persists in the atmosphere for a long time, warming the Earth for at least 1,000 years.

<https://www.wind-watch.org/news/2019/09/14/electrical-industrys-dirty-secret-boosts-warming/>

Across the entire UK network of power lines and substations, there are around one million kilograms of SF6 installed. A study from the University of Cardiff found that across all transmission and distribution networks, the amount used was increasing by 30-40 tonnes per year.

<https://www.mdpi.com/1996-1073/11/8/2037>

By its very nature, leaks of the gas immediately drop to the lowest points of elevation around the area of the source. Wherever the gas lands, it starts to pool in increasing concentrations, and easily inhaled by the cattle grazing farmland underneath turbines and the children we see on television. It can continue to leak into underground holes, relatively undisturbed by lighter natural air that flows around it. In open landscapes it will probably eventually be dissipated by strong winds and sent on its way to damage the Ozone layer. What has not been properly examined, however, is the behaviour of SF6 gas in association with wind turbines constructed in upland areas where the gas will flow downhill, into the populated valleys below where it could pool and cause significant damage to health.

Upon inhalation, SF6 gas exchange occurs within small pulmonary arteries no differently than the gas exchange to do with oxygen, except that it has a lower solubility rate and it affects the brain (nervous system) like an unmonitored anaesthetic that will disrupt, impair or even kill depending on dosage. For this reason, it is a neurotoxin with properties that inevitably affect living humans and animal neuronal systems including related side-effects upon ingestion or inhalation at persistent levels of exposure.

Studies in France have concluded that cattle grazing underneath wind turbines have been seriously affected by ingestion of SF6 gas. SF6 gas has been found in autopsies on affected cattle.

<https://www.wind-watch.org/news/2019/09/23/sf6-cattle-and-ai-the-increasing-need-for-an-anamin%E2%80%8B-policy-in-the-eu/>

<https://www.linkedin.com/pulse/sf6-f-h-campbell/>

Notes on recycling of wind turbines.

The average life span for the blades of a wind turbine is approximately 20-25 years. Because of the current rapid growth it can be expected that thousands of turbine blades will need to be decommissioned within the next 20 years.

Turbine blades require considerable amounts of balsa wood in their construction which involves the felling of balsa trees and there is already a world shortage of balsa. The remainder of the blade is largely fibre glass and there are currently three options for the disposal; landfill, incineration and recycling.

Landfill: disposal represents the cheapest option; however, most countries aim to reduce the amount of landfill waste, and in the future disposal of such a large amount of material will be unacceptable.

Incineration: Turbine blades are constructed from balsa wood and fibreglass. The wood and the fibreglass cannot easily be separated so, whilst they can be burned for calorific value as a source of energy, incineration leads to the production of hazardous by-products and approximately 60% material remains as scrap which will be disposed of in a landfill, or recycled as construction filler within a material.

Recycling: There are currently no methods by which wind turbine blades can be fully recycled, latest developments merely break down the blades so the material can be used as insulation or in other concrete structures. Concrete accounts for 25% of world-wide carbon emissions.

Is it not bizarre that a major component of something trumpeted widely as being ‘the green solution’ is not, itself, re-cyclable?

The base of a turbine consists of reinforced concrete in an excavation in the ground. Enquiries of Scottish Power Renewables have indicated that a 200mtr turbine will require approximately 400 cubic metres of concrete. (This is about the volume of a two-bedroom bungalow.) It equates to (in round terms) 50 mixer lorries per turbine, transporting at 10 miles to the gallon. In reality, however, in deep peat conditions there may be up to twice as much in each base.

There is also the construction of roads to the wind farm site and between the turbines to be considered. These involve quarrying huge volumes of stone, crushing it and transporting it, excavating enormous quantities of peat with the consequences noted above.

In truth, turbine bases and their associated roads will never be deconstructed or recycled.

Conclusion.

It can be seen from the above that, contrary to the way in which wind turbines are presented, they are not benign. There is no doubt that wind has a place in a properly considered alternative energy strategy but merely allowing the unfettered proliferation of wind farms across unspoilt areas of the country is not what is needed. This policy is environmentally damaging and will make no more than a peripheral and incidental contribution to achieving the Scottish Government’s stated aims of carbon neutrality by 2045.

Renewable Energy – the case for a balanced approach

Personal Experiences.

A number of people affected by wind farm construction have been kind enough to share their personal experiences. These are set out below in no particular order.

1. It is well known that once developers have planning permission and start building their turbine farms, all their undertakings of consideration for local residents are ignored - largely because local authorities do not have the resources to monitor them.

When they needed to connect Kilgallioch to the grid, the single-track road from Barrhill to New Luce was closed 7 days a week for 7 weeks from 9am to 5pm & 6pm to 9pm. Residents were not allowed to use the forestry roads so there were very long diversions. A quick 6-mile round trip to Barrhill turned into a 100-mile round trip!

There was supposed to be a minibus from Barrhill car park to the station. This never happened and people having to walk to the station got dog's abuse from the contractor.

The dry-stone wall boundary along the road to the station was systematically demolished by trucks doing multipoint turns. No reparation was made to the property owner. Complaints to South Ayrshire Council achieved nothing.

Barrhill Resident

2. We bought our property thirty years ago. We moved here because of the peace and tranquillity of the area and to enjoy the open spaces and wildlife. At that time, we enjoyed a 360-degree view of farmland, open moorland and forest. We created a lovely garden and, of a summer's evening, would often sit out enjoying the silence; silence of a depth which must be experienced to be believed. Later, the dark sky revealed a myriad of stars.

That has all gone. Now my 360-degree view includes almost 200 giant wind turbines, the silence has disappeared to be replaced by indescribable continuous noise. I never even visit the garden because I can't stand the noise and the dark sky is gone, replaced by the lights of turbine maintenance. Sometimes I have to go away, just to get a night's sleep. My life is a misery.

Resident of the Barrhill Community Council area

3. Life in rural areas is no easier than anywhere else, indeed the additional costs (fuel etc) lesser access to general amenities and lower job opportunities make it arguable that country life is, in fact more difficult than many. The important thing to note is that, for most country dwellers, the compensation of living in undisturbed surroundings with few people, and little disturbance, almost no noise pollution or light pollution and access to open spaces with wildlife and birds is a vital mitigating factor.

A continuing theme for villagers and others who have experienced wind farm development is the dishonesty and the huge disparity between what is presented by the developer and what actually happens. It should be noted that, for many, the objection to wind farms is a continuation of the previous objection to massive electricity pylons, an objection which also, sadly, was overruled by government.

Community experiences include:

<u>Presentation</u>	<u>Actuality</u>
<u>Inconvenience</u> – the construction and operation of a wind farm would cause little disruption	Extreme noise and disruption during the construction phase and continuing effects thereafter.
<u>Roads</u> – roads will be improved to enable access to the wind farm and this improvement will be maintained thereafter.	The bare minimum was done to enable construction with considerable damage occurring which has never been rectified.
<u>Intrusion</u> – the visual impact of the development will be mitigated as far as possible by siting turbines where they will have least effect.	No action taken.
<u>Employment</u> – opportunities for local employment during the construction phase and afterwards in ongoing management and maintenance.	Construction workers imported and no or minimal local jobs in the operational phase. Hardware not even manufactured in Scotland (or UK).
<u>Tourist interest</u> – green energy is very much in the news; people will come to see success in action.	Quite the opposite, tourists come to remote and wild areas for peace and quiet, avoiding wind farms due to the industrial landscape and absence of wildlife.
<u>Noise</u> – there will be no significant increase in background noise levels and no noticeable impact upon people’s lives.	The reality is very different, earthquake level disruption during construction and some residents even attributing physical illness to the operation of the turbines.
<u>Wildlife</u> – will be unaffected, there is no discernible impact on birds or animals. Deer management will ensure a comfortable co-existence.	Short term increase in scavengers due to bird strikes, thereafter an almost complete absence of bird-life other than corvids, deer move away, little other wildlife except predators / scavengers.
<u>Watercourses</u> – will be protected from pollution, private water supplies will be safeguarded, delicate ecosystems for fish spawning and rare species will be preserved.	Total disregard for all of these matters. Preservation of important archaeological or cultural treasures left to the discretion of machine operators.
<u>Incentives</u> – possible improvement of village hall, play park, tourist / education centre funding for community projects.	Some small work undertaken but hurdles for most funding too high to be achievable.

Overall, the impact on the villages is often extremely negative destroying rather than encouraging community spirit and creating divisions between the small number who benefit (village shop, village pub etc.) and those who do not. Also, between those who are negatively affected by noise or disruption and those who, by accident of location, have a happier experience.

Community initiatives such as litter picking, flower planting, maintaining the village hall fall by the wayside because of the general assumption that ‘the community fund will take care of that’. The reality is that community funds are impossible to obtain for such purposes. Construction of a bowling green involving no opportunity for a local contractor to tender and no employment of local labour.

A patronising expectation that a grateful community will be happy to fill out endless forms, attend endless meetings and dream up projects to achieve what was formerly done by

volunteers produces initially apathy and later distrust and withdrawal from participation. Eventually there is resentment because the promises made at the proposal stage do not materialise.

4. I urge the community to resist the hard sell of “green”. Our countryside which we understand, live in and enjoy is “green”, these incoming developers have no regard for that. Trees are vital as a renewable energy source, yet they are mown down in disregard for the long term consequence. The developers have no interest in preserving habitats, heritage or the future of rural communities and money does not replace community spirit. The “community benefit fund” causes real division and hardship as small tourist businesses lose custom and those who can, move away from this metal forest. Many of us came to this community to get away from callous “fat cats”, avarice, and vice and replace it with calm uncluttered natural beauty. Much of this has been swept away.

There are NO jobs created, NO funding benefits, NO tourists flocking to the wind farm experience, NO positive impact on local businesses, NO investment in our community and NO positive legacy at all.

Wind farms are the utilisation of taxpayers’ money, investment loopholes and political shenanigans to line the profits of unscrupulous bankers and foreign profiteers. It’s a national disgrace.

Comments by several residents of Barr Village

5. Some years ago, we faced the prospect/possibility of a wind farm being built on a hill behind our home. There followed a ten-year battle which culminated in my husband suffering a near-fatal heart attack. I’ve no fight left in me.

Withheld at resident’s request.

CHS.

23rd December 2019