Environment and Sustainability Committee
Inquiry into Energy Policy and Planning in Wales
EPP 157 – Professor B O'Neill

National Assembly for Wales' Environment and Sustainability Committee – Submission

20th September 2011

Professor William O'Neill

Introduction:

This paper is in response to the consultation request to provide input for consideration by the Environment and Sustainability Committee. In order to position the arguments in this paper it might be worth noting the experience I have and hence the validity of the arguments presented. All arguments in this paper are taken from freely available published information combined with experience in the energy sector, coupled with extensive technical experience and qualifications.

Experience in the energy sector includes a senior role in the design and delivery of the United Kingdoms last Nuclear Power Station 'Sizewell B', experience in writing safety case submissions for Nuclear and conventional Power Station proposals and carrying out a extensive review of previous Nuclear accidents making sure the alarm system design for 'Sizewell B' and other Nuclear stations in France did not suffer from the same problems.

In terms of renewable energy I have made an extensive study in to the various technologies and I am currently a visiting professor at De Montfort University and have links to that Universities Sustainable Energy research department.

I hold a B.Sc (hons) in Control Engineering, an M.Sc in Computer Science and a PhD. I am also a Chartered Engineer (C.Eng) and Chair of the De Montfort Universities industrial liaison committee, which promotes research with industry in all engineering sectors including energy.

I am currently employed as a Strategy Director for a European Pharmaceutical company.

I live in the uplands of Powys and hence have a great passion for preserving the beauty of this area.

I would be happy to provide the committee with further support if this would be of benefit.

The remainder of this submission will address the following four objectives as set out for the committee, grouping discussion and information accordingly under the relevant objective area for convenience of the committee.

The objectives addressed are:

1. What are the implications for Wales if responsibility for consenting major onshore and offshore energy infrastructure projects remains a matter that is reserved by the UK Government?
2. How does this affect achievement of the Welsh Government's aspirations for various forms of renewable and low carbon energy as set out in the Energy Policy Statement?
3. How does this affect delivery of the Welsh Government's target for a 3 per cent reduction in Green House Gas emissions per annum from 2011?
4. What will be the impact if consenting decisions on major infrastructure projects and associated development are not all taken in accordance with Welsh planning policy?

Objective 1

It is difficult to see how Welsh Assembly will have any room for manoeuvre in terms of large energy projects, or other large capital intensive projects. The potential constraints imposed by the new draft planning policy, coupled with the National Planning Statements (various EN1, EN3) and the Planning Act 2008, would seem to put the Welsh Assembly in a very difficult position. It would appear, even if the localism bill is passed, that developments of national importance cannot be rejected on a local level. A recent conference on Wind Farms addressed this issue and concluded that the National Energy policy and Localism could not be reconciled.

The draft national planning policy states that "Development that is sustainable will go ahead without delay". However, sustainable is a dangerous word that has many definitions. I would urge the committee to include an economic and social perspective when considering this definition. Renewable does not necessarily mean sustainable or indeed ethical.

In terms of the Welsh Assembly there are a number of policy and guidance documents that also open the flood gates for the irresponsible development of massive Wind Farms and their associated infrastructure. For example:

- The low carbon revolution
- Planning policy in Wales
- Technical Advice Note No. 8 Planning for renewable energy

All of the above should be revisited from a number of perspectives.

Firstly, consider the economic in terms of the current investment climate. Secondly, technologically as there are far more effective forms of low carbon energy generation than Wind. Thirdly, the impact on irreplaceable rural landscape and rural communities across Wales. And finally, in the legality of these policies and guidelines with respect to European Directives and conventions. For example:

- European Landscape Convention (ETS No 176, Oct 2000)
- European Directive on Environmental Assessment

If we now consider the targets ahead, then it is clear that the Welsh Assembly Government will not have any influence on the march towards the government's targets, unless it acquires further devolved powers for large capital projects. The EU target is to have 15% renewable energy by 2020 and 80% by the mid of the century. To have any chance of hitting this target the UK generating fleet must be largely decarbonised by 2030. To understand the challenge it is worth noting that in 2010 only 10% of UK energy supply came from low-carbon sources: 6.4% Nuclear, 2.3% Biomass, 0.4% Wind, 0.1% Hydro, 0.6% Transport Fuels, 0.1% Other. To make things worse Wind and Hydro were impacted by poor weather conditions in 2010.

There is no firm consensus on how the UK can reach these targets but one thing that most can find common ground with is that the current market arrangements will not deliver the scale of long-term investment needed, at the pace required, to meet these targets. To that end it is likely that Wales will be left with under investment in Energy, a scared landscape, as we see in Scotland, as will be discussed later, no real improvement in the economy or jobs for the people of Wales.

Objective 2

In terms of impact on the Welsh Governments aspirations for renewable and low carbon energy, the following is addressed in this section:

- Impact on economy and employment
- Impact on rural community

Impact on economy and employment

To achieve the government's target of 30% electricity generation from renewables by 2020 will cost 9 to 10 times the capital cost as compared to the equivalent Gas Fired Stations. The accepted cost of this investment for hitting the renewables target is around £100 billion. The justification for this investment is a 34% reduction in Co2 by 2020 (1990 levels). However, this amounts to 3 to 4% of Gross Domestic Product annually. Given the diversion of this amount of investment the question must be raised if the government had understood just what it was taking on at the time the target was set.

However, when considering this massive investment, which is more than twice the currently investment in the energy sector, we need to look at the impacts.

Effectiveness of Wind based renewables is questionable with current technology and documented extensively despite the various industry lobbyists arguments to the contrary. Subsidies generate profit and developers cash in on this incentive. A major argument is creation of jobs and creation of new competitive industries in the green sector. However, if we consider it from a macroeconomics perspective we see the following:

- Employment generated in the economy may be increased, short term, in the manufacture and construction of Wind Farms but this ignores diversion of significant investment from the rest of the economy. This investment could be reduced 10 times and still achieve the same CO2 reduction targets, whilst using the capital in real job creation which would stimulate growth in the economy.
- Investigation in to green energy employment (UK, FR, DE) shows green energy is highly capital intensive 9 to 10 times of conventional power generation sources. Also initial employments drop off sharply with manufacture and construction being carried out by foreign firms.
- Spending £109 billion on Wind, rather than £13 billon on conventional will create jobs, (manufacture abroad), but will divert spending from other sectors.
- However, 35% of green investment is spent on wages, where as for other sectors it is 70%
- Also, remember that funding is also generated through our taxes, therefore reducing money available for public spending and wages
- Innovation & new industries, claimed as a benefit by every country and will be dominated by China
- Wholesale price of renewable & conventional electricity will increase to cover capital & operating costs of renewables, which will impact our traded goods sectors as other countries do not have the same policy
- Result will be lower wages or most likely, relocation overseas. Plus dismal prospects for our manufacturing sector
- The cumulative impact will be a loss in potential of 3% to 4% of GDP, initially in loss of employment and later in reduced income levels

The conclusion is that increased overall employment in the country due to 'green' employment is a myth. For every green job at least one conventional job will be lost, either from the current fossil fuel energy sector, or from other areas of the economy where investment has been withheld to pay for the renewables investment target. I have only looked at the figures for the UK as a whole, but not as a proportion for the impact on Wales specifically. The following is a quote from Professor Gordon Hughes Processor of Economics at Edinburgh University who has also been a government advisor on the environment.

"The decision to sacrifice at least 2% of GDP to reduce the UK's emission of CO2 by about 23 million metric tons per year, less than 4% of total emissions of greenhouse gases in 2008, is a choice that must

ultimately be made by the public. They will have to bear the costs via lower real disposable incomes and higher prices. Claims by politicians and lobbyists that green energy policies will create a few thousand jobs are not supported by the evidence. More importantly, they are irrelevant when considering the choice that has to be made. Sadly, the claims seem intended to divert attention from the consequences of setting arbitrary and poorly-considered targets for renewable energy. "

Impact on rural community

In a perfect world we would all have our own micro-generating equipment, covering our own needs and pushing excess generating capacity back on to the national grid. However, with a starting price of £14K and little or no substantial government subsidies, this is not an option for the majority of people. Instead we are faced with ever increasing electricity bills to cover the stopgap energy deficit caused by successive governments' lack of investment in the generating fleet by chaotically building Wind generation capacity in environmentally sensitive areas. The strategy would appear to be plugging the energy generating gap with Wind generation in the short term, at high cost in terms of investment verses output, passing on to us as consumers until the nuclear fleet can be updated and extended with the introduction of third generation nuclear reactors and improvements to other thermal stations in the current generating fleet.

Putting the question of Wind generation aside and looking purely at the way Wind farm projects are enforced in many rural areas opens a number of key questions on the rights of the individual and power of big business to exploit those individuals with little or no redress. This is despite a number of European statutes such as the "The European Landscape Convention (ELC)" which became binding in March 2007 and is the first international treaty to focus specifically on landscape. A main article of this convention is: "Landscape must become a mainstream political concern, since it plays an important role in the well-being of Europeans who are no longer prepared to tolerate the alteration of their surroundings by technical and economic developments in which they have had no say. Landscape is the concern of all and lends itself to democratic treatment, particularly at local and regional level."

There are many examples of non-ethical behaviour in UK based Wind Farm projects. If we consider the current proliferation of Wind Farm projects in Mid-Wales as a result the Welsh Government opening the flood gates to developers with its release and subsequent amendments to Technical Advice Note 8, which identifies large areas of Wales, including Mid-Wales that are suitable for Wind Farm development. Having released this invitation, with little consultation with the public, it is no wonder that developers are flooding in.

The impacts of building Wind Farms are again well documented. In Mid-Wales the size and number of Wind Farms and the additional connections by National Grid, in the form of Pylons, running from the coast to Shropshire, in a previously unspoiled landscape makes these proposals candidates for legal challenge in contravention of agreed European Directives. However, these developments typically go through a number of stages and take around 3 to 5 years from initial proposal to commissioning and operation. During that time local people are subjected to developer propaganda and manipulation of rural people who simply do not grasp the severity of the impact they will suffer. Public consultations are run poorly with developer behaviour being questionable (this is documented in a number of Wind Farm projects). Obviously local people oppose the developers, central and local government at planning, public enquiry stages and in the appeal courts and so on. But, during the 3 to 5 year period local people are under extreme stress, fighting a faceless big business, seeing little support from government, the constant threat of major impacts to their community, house values and environment. In a rural area houses are often part of people's pension planning, therefore giving the worry of hardship in later life. Rural areas such as Mid-Wales are defined by their country side with a high contribution to the local economy from tourism businesses which start to see impacts and again this stress takes it toll.

Well before projects are approved, local people observe developers starting to buy up land, pay local land owners to put pylons on their land. Councils seem to start to approve infrastructure improvements in anticipation of the developer's projects getting approval. Even if this is not the case, distrust between the community and councils drives this perception. Again, this reinforces the message to the people that they

have no say in the approval process and developers and government are simply going through the motions. A further result is setting communities against each other, rural communities are very tight and have been for generations, but developer's tactics cause server amounts of strife.

As a consumer who supports real sustainable and renewable energy generation and not quick-fix onshore wind solutions, perhaps choosing an ethical electricity supplier could be an option. However, in this case 'ethical supplier' is not defined in terms of a company who claims ethical investments by supporting initiatives overseas, but one that avoids exploiting local communities here in the UK. The exploitation of local communities across the UK in the name of obscene short-term profit cannot be the actions of an ethical company or an ethical government.

Summary

The impacts on the Welsh government's ability to achieve a renewable and low carbon energy target are substantial:

- The level of investment to achieve the targets is unlikely to be available
- Promises of increased employment across Wales are unlikely to be achieved
- Feeling that government has not consulted and treated the Welsh people fairly will be reflected at the ballot box

Objective 3

Whilst renewable energy is receiving a huge investment from a power generation perspective the following should be understood when considering low CO2 generating solutions.

The load curve for UK generation shows that much of the electricity demand is in fact for continuous 24/7 supply (base-load), while some is for a lesser amount of predictable supply for about three quarters of the day, and less still for variable peak demand up to half of the time. Some of the overnight demand is for domestic hot water systems on cheap tariff. With overnight charging of electric vehicles it is easy to see how the base-load proportion would grow, increasing the scope for nuclear and other plants which produce it.

Most electricity demand is for continuous, reliable supply that has traditionally been provided by Base-load electricity generation. Some is for shorter-term (e.g. peak-load) requirements on a broadly predictable basis. Hence if renewable sources are linked to a grid, the question of back-up capacity arises, for a stand-alone system energy storage is the main issue. Apart from pumped storage hydro systems, no such means exist at present, at least on any large scale.

So what forms of energy are available to be used in Wales?

Hydro

Hydro-electric power, using the potential energy of rivers, is by far the best-established means of electricity generation from renewable sources. It now supplies 16% of world electricity (99% in Norway, 58% in Canada, 55% in Switzerland, 45% in Sweden, 7% in USA, 6% in Australia). Apart from those four countries with an abundance of it, hydro capacity is normally applied to peak-load demand, because it is so readily stopped and started.

Wind Energy

Total world wind capacity is 194 GWe. Wind turbines of up to 5 MWe are now functioning in many countries, though most new ones are 1-2 MWe. The power output is a function of the cube of the wind speed, so doubling the wind speed gives eight times the energy potential, but requires massive turbine structures. In operation such turbines require a wind in the range 4 to 25 metres per second (14 - 90 km/hr), with maximum output being at 12-25 m/s (the excess energy being spilled above 25 m/s). While relatively

few areas have significant prevailing winds in this range, therefore massive numbers are required to have enough to be harnessed effectively and to give a 25% capacity.
Generating efficiency of wind turbines is very poor. It's like buying a Mercedes and only being able to drive it a quarter of the time. Alternative conventional power sources allow the system to cope with low or high wind periods, but this is where the back-up issue arises.

Where there is an economic back-up which can be called upon at very short notice (eg hydro), a proportion of electricity can be provided from wind. The most economical and practical size of commercial wind turbines is now up to 2 MWe, grouped into wind farms up to 200 MWe.
Depending on site, most turbines operate at about 25% load factor over the course of a year (European average).

Energy generation costs are significantly greater than those for coal or nuclear, and allowing for backup capacity and grid connection complexities adds to the cost. Wind is intermittent, and when it does not blow, back-up capacity such as hydro or gas is needed. When it does blow, and displaces power from other sources, it may reduce the profitability of those sources and hence increase prices. However, government subsidies ensure that power from wind turbines is able to be sold.

Wind turbines have a high steel tower to mount the generator nacelle, and have rotors with three blades up to 50m long. Foundations require a substantial mass of reinforced concrete. Hence the energy inputs to manufacture are not insignificant. Also siting is important in getting a net gain from them.

Solar Energy

Solar energy is readily harnessed for low temperature heat, and in many places domestic hot water units (with storage) routinely utilise it. It is also used simply by sensible design of buildings and in many ways that are taken for granted.

Three methods of converting the sun's radiant energy to electricity are the focus of attention. The best-known method utilises sunlight acting on photovoltaic cells to produce electricity. Flat plate versions of these can readily be mounted on buildings without any aesthetic intrusion or requiring special support structures. **Solar photovoltaic (PV)** has application for certain signalling and communication equipment, such as remote area telecommunications equipment. Sales of solar PV modules are increasing strongly as their efficiency increases and price falls. Thin film PV modules using silicon or cadmium telluride are at least 20% less costly than crystalline silicon-based ones, but are less efficient. More efficiency can be gained using **concentrating solar PV** (CPV), where some kind of parabolic mirror tracks the sun and increases the intensity of the solar radiation up to 1000-fold. PV (HCPV) technology to Stirling Energy Systems with a view to commercializing it
for plants under 50 MWe from 2012. The HCPV cells in 2009 achieved a world record for terrestrial concentrator solar cell efficiency, at 41.6%. Many Solar PV Plants are connected to electricity grids in Europe and USA. The OECD IEA reports 23 GWe of solar PV capacity in 2009, 17 GWe of this in Europe. Japan has 150 MWe installed and the USA had over 200 MWe of utility-scale PV at end of 2010.

A Solar thermal power plant has a system of mirrors to concentrate the sunlight on to an absorber, the energy then being used to drive turbines - **concentrating solar thermal power** (CSP). The concentrator may be a **parabolic mirror trough** oriented north-south, which tracks the sun's path.

Tidal Energy

Harnessing the tides with a barrage in a bay or estuary has been achieved in France (240 MWe in the Rance Estuary, since 1966), Canada (20 MWe at Annapolis in the Bay of Fundy, since 1984) and Russia (White Sea, 0.5 MWe), and could be achieved in certain other areas where there is a large tidal range. The trapped water can be used to turn turbines as it is released through the tidal barrage in either direction.

Placing free-standing turbines in major coastal tidal streams appears to have good potential, and this is being explored. Currents are predictable and those with velocities of 2 to 3 metres per second are ideal and the kinetic energy involved is equivalent to a very high wind speed. This means that a 1 MWe tidal turbine rotor is less than 20 m diameter, compared with 60 m for a 1 MWe wind turbine. Units can be packed more densely than wind turbines in a wind farm, and positioned far enough below the surface to avoid storm damage. Early in 2008 a 1.2 MWe twin turbine was installed in Strangford Lough, Northern Ireland, billed as the first commercial unit of its kind and expected to produce power 18-20 hours per day.

Wave Energy

Harnessing power from wave motion is a possibility which might yield significant electricity. The feasibility of this has been investigated, particularly in the UK. Generators either coupled to floating devices or turned by air displaced by waves in a hollow concrete structure (oscillating water column) are two concepts for producing electricity for delivery to shore. Other experimental devices are submerged and harness the changing pressure as waves pass over them. The first commercial wave power plant is in Portugal, with floating rigid segments which pump fluid through turbines as they flex at the joints. It can produce 2.25 MWe. Another - Oyster - is in UK and is designed to capture the energy found in near-shore waves in water depths of 12 to 16 metres.

Biomass

Burning biomass for generating electricity has some appeal as a means of utilising solar energy for power. However, the logistics and overall energy balance usually defeat it, in that a lot of energy is required to harvest and move the crops to the power station. This means that the energy inputs on growing, fertilising and harvesting the crops then processing them can easily be greater than the energy value in the final fuel, and the greenhouse gas emissions can be similar to those from equivalent fossil fuels. Also other environmental impacts can be considerable.

Nuclear Energy

In recent years there has been discussion as to whether nuclear power can be categorised as "renewable". In the context of sustainable development it shares many of the benefits of many renewables, it is a low-carbon energy source, it has a very small environmental impact, similarities that are in sharp contrast to fossil fuels. But commonly, nuclear power is categorised separately from 'renewables'. Nuclear fission power reactors do use a mineral fuel and demonstrably depletes the available resources of that fuel. In the future nuclear power will make use of fast neutron reactors. As well as utilizing about 60 times the amount of energy from uranium, they will unlock the potential of using even more abundant thorium as a fuel. In addition, some 1.5 million tonnes of depleted uranium now seen by some people as little more than a waste becomes a fuel resource. In effect, they will 'renew' their own fuel resource as they operate. The consequence of this is that the available resource of fuel for fast neutron reactors is so plentiful that under no practical terms would the fuel source be significantly depleted. 'Renewables', as currently defined, would offer no meaningful advantage over fast neutron reactors in terms of availability of fuel supplies. Most also tend to make very large demands on resources to construct the plant used for harnessing the natural energy - per kilowatt hour produced, much more than nuclear power.

Decentralised Energy

Centralised state utilities focused on economies of scale can easily overlook an alternative model - of decentralized electricity generation, with that generation being on a smaller scale and close to demand. Here higher costs may be offset by reduced transmission losses (not to mention saving the capital costs of transmission lines) and possibly increased reliability. Generation may be on site or via local mini grids.

Summery

It is clear that renewable energy sources have potential to increase their contribution to meeting mainstream electricity needs. However, having solved the problems of harnessing them there is a further challenge: of integrating them into the supply system. Obviously sun, wind, tides

and waves cannot be controlled to provide directly either continuous base-load power, or peak-load power when it is needed, so how can other, controllable sources be operated so as to complement them? If there were some way that large amounts of electricity from intermittent producers such as solar and wind could be stored efficiently, the contribution of these technologies to supplying electricity demand would be much greater. Already in some places pumped storage is used to even out the daily generating load by pumping water to a high storage dam during off-peak hours and weekends, using the excess base-load capacity from low-cost coal or nuclear sources. During peak hours this water can be used for hydro-electric generation. Relatively few places have scope for pumped storage dams close to where the power is needed, and overall efficiency is low.

The 2006 report from a thorough study commissioned by the German Energy Agency (DENA) looked at regulating and reserve generation capacity and how it might be deployed as German wind generation doubled to 2015. The study found that only a very small proportion of the installed wind capacity could contribute to reliable supply. Depending on time of year, the gain in guaranteed capacity from wind as a proportion of its total capacity was between 6 and 8% for 14.5 GWe total, and between 5 and 6% for 36 GWe total projected in 2015. This all involves a major additional cost to consumers.

Grid management authorities faced with the need to be able to dispatch power at short notice treat wind-generated power not as an available source of supply which can be called upon when needed but as an unreliable energy source. In any case wind needs about 90% back-up, whereas the level of back-up for other forms of power generation which can be called upon on demand is around 25%, simply allowing for maintenance downtime.

A specific indication of the cost increment of wind over power generation from other sources is given by the 4.5 - 5.0 p/kWh market value for the Renewables Obligation, by which utilities can cover the shortfall in producing a certain proportion of their electricity from renewables by paying this amount and passing the cost on to the consumer. In addition there is a Climate Change Levy of 0.43 p/kWh on non-renewable sources (at present including nuclear energy, despite its lack of greenhouse gas emissions), which corresponds to a subsidy.

Objective 4

If Welsh Planning Policy promotes massive Wind Farm development in Wales, and in particular, Powys the biggest impact will be on landscape.

Let us first try and define landscape. The following definition is taken from the European Landscape Convention (ETS no 176, Oct 2000): "The landscape is part of the land, as perceived by local people or visitors, which evolves through time as a result of being acted upon by natural forces and human beings. "Landscape policy" reflects the public authorities' awareness of the need to frame and implement a policy on landscape".

Wind Farm development is a current major concern to the public, both in Powys and across the UK. There are very few communities that, in considering a proposed application for a Wind Farm in their community, have the experience of having already lived with a number of existing Wind Farms. This has two outcomes. There are those who were fiercely opposed to the original development, on the other hand there are those who, before construction, had no idea as to how such a development would impact on the landscape and now wonder why they didn't oppose the development more strongly at the time. As can now be seen in Powys these two groups represent a significant number of individuals, groups and organisations (refer to IPC 'Scoping Opinion for Proposed Dyfnant Forest Windfarm' response document) strongly opposed to further Windfarm development across Mid-Wales.

The remainder of this section takes as its theme the impact of large scale Windfarm development up on the rural landscape of Mid-Wales. In terms of importance this topic is critical as landscape is Mid-Wales greatest asset in terms of farming, attracting a wealthy middle class demographic and tourism. In terms of

tourism without the outstanding landscape Mid-Wales would be a direct road for tourists to the coastal resorts.

Cumulative Landscape Effects

Whilst individual developments and proposed changes to the landscape may have large positive and well as negative effects, the committee needs to recognise that cumulative effects of ad-hoc or distributed developments can have a wholly negative effect on the landscape.

TAN 8 para 8.2 recognises the issue of cumulative impact and states:

"Cumulative effects are those which occur, or may occur, as a result of more than one wind farm project being constructed. The degree of cumulative
impact is a product of the number of and distance between individual wind farms, the inter-relationship between their Sub-areas of Visual Influence
(ZVI), the overall character of the landscape and its sensitivity to wind farms, and the siting and design of the wind farms themselves. It is important to
recognise that cumulative effects consist of both those upon visual amenity as well as effects on the landscape. The degree of cumulative impact also gives rise to the notion of thresholds, beyond which impacts may not be acceptable."

The committee needs to set clear guidance on what is "acceptable" in order to prevent Powys from becoming a Wind farm industrial sprawl landscape.

Cumulative visual impact is an inexact science. It is highly subjective, but most people would accept that having unreasonably large Windfarm developments in visual proximity and forming a significant part of the visual landscape of the Powys uplands it is vital that the committee supports the need to involve the community directly.

TAN 8 para 8.2 recognises the issue of cumulative impact and states:

"Cumulative effects are those which occur, or may occur, as a result of more than one wind farm project being constructed. The degree of cumulative
impact is a product of the number of and distance between individual wind farms, the inter-relationship between their Sub-areas of Visual Influence (ZVI), the overall character of the landscape and its sensitivity to Wind farms, and the siting and design of the Wind farms themselves. It is important to recognise that cumulative effects consist of both those upon visual amenity as well as effects on the landscape. The degree of cumulative impact also gives rise to the notion of thresholds, beyond which impacts may not be acceptable."

It is suggested that the committee addresses criteria for identification of cumulative landscape and visual amenity impacts. Two further areas to include for Wind farms are:

- Associated infrastructure links from the energy generating source and the national grid. Good practice states that Windfarm development should be in close proximity to either generated energy users, or to the national grid.
- Turbine height is a problem but swept area is also another landscape consideration. Swept area as being the area of the circle created by the turning blades of each turbine. For example the swept area for the Dyfant forest proposed wind farm development is 97 acres.

It is inconceivable to claim that 97 acres of movement against a landscape and skyline such as this will not be visually intrusive.

In considering Visual Impact, thought should be given to the effect on tourism; this especially at a time when discretionary spend of individuals for UK holiday travel is being reduced by the current poor UK and

International economic climate. The knock-on impacts on tourism in and adjacent to Powys need to be understood. Adjacent areas are:

- **Brecon Beacons National Park** – National Park designation
- **Ceredigion**
- **Denbighshire** – Area of Outstanding Natural Beauty (AONB) and Area of Natural Beauty
- **Gwynedd** – Area of Outstanding Natural Beauty (AONB and Landscape Conservation Areas
- **Hereford** - Landscape Character Assessment with a focus on landscape sensitivity and capacity
- **Neath Port Talbot** – Landscape Character Assessment supported by Design in the Landscape Guidance
- **Shropshire** – Landscape Character Assessment with a focus on landscape sensitivity and capacity
- **Snowdonia National Park** - National Park designation, Areas of Natural Beauty.
- **Wrexham**

Many tourists, who visit Powys and adjacent areas this area, do so to fish, to sail, to cycle and to walk. Any one of these activities is based on a need to access landscape beauty and to experience visual appreciation. These activities also have an economic impact on the region. A report entitled "The Economic Value of Walking in Rural Wales" by Professor Peter Midmore demonstrates that rural walking related tourism alone generates £132m of revenue and creates some 4,800 full time jobs. The local authorities together with the Wales Tourist Board have identified this opportunity website www.hiraethog.org.uk.

It is recommended that views from the various groups and societies be canvassed in the consultation and subsequent formulation of policy. In order to reinforce this statement I have included reviews from the various groups and societies concerning the recent "Scoping Opinion Dyfnant Forest Windfarm June 2011" submission response. This shows the value in engaging with these groups in policy formulation. The response by the IPC can also be used to inform the committe in terms of criteria and level of detail against which local development planning submissions should be reviewed.

General landscape clarifications required by the IPC

The IPC indicated that SPR did not provide information concerning the landscape character if the proposed development site or surroundings. In addition, no specific landscape planning policy was included.

The IPC further indicated that SPR had not included the location and planning status of Snowdonia National Park within the text of the Scoping Report, even though the Scoping Report shows that the National Park is located approximately 1km from the western boundary of the proposed Development site. SPR should therefore assess the potential impacts of the proposed Development on this designation. In addition, impacts on other counties, where they occur should be discussed with the relevant bodies.

The submission to the IPC indicated that consultations have taken place with the general public and with the various groups and societies across Mid-Wales. However, no information concerning the results of those consultations has been included. The committee needs to ensure that developer consultations are made public and in the case of large development, available to the IPC.

In addition the Aviation Authority (CAA) has provided input in respect of lighting and marking. "The potential effects of the need to install aviation obstruction lighting on the turbines should also be considered in relation to potential effects on visual amenity both during the day and at night."

"*The IPC recommends that in considering the physical effect of the proposed Development, consideration should also be given to tourism and recreational assets such as the nearby caravan parks, guesthouses and hotels*."

The above is just a sample of the valuable information that would inform the formulation of new policy and certainly the TAN 8 review.

Example of group & societies feedback

The following list shows a few example groups, societies etc that were consulted concerning the SPR development proposal. Comments from the full list of groups extend to 156 pages addressing issues such as:

- Tourism
- Landscape cumulative impact
- Ecology
- Hydrology
- Peat land / CO2 emission
- Traffic
- Policing
- Nation Park and areas of outstanding beauty
- Demographics

Example groups include, but it should be noted that the SPR public consultation results are absent. The committee need to ensure that the general public's views are factored in and not hidden if they are not favourable to the proposed development:

Brecon Beacons National Park Authority, Civil Aviation Authority, Countryside Council for Wales
Dyfed Powys Police Authority, Environment Agency, Health Protection Authority
Health and Safety Executive, Snowdonia National Park Authority, Welsh Government &Powys & Shropshire councils

References

- IET libraries containing published information for this leading engineering institution
- Technical Advice Note No 8
- European Landscape Convention (ETS No 176, 2000)
- European Directive On Environmental Assessment
- The Welsh Assembly Energy Policy Statement. The low carbon revolution
- Planning policy in Wales
- National Planning Statement for renewable energy infrastrucutre (EN3)
- Alvarez, G.C., Jara, R.M., Julian, J.R.R. & Bielsa, J.I.G. (2009) Study of the effects on employment of public aid to renewable energy sources, Universidad Rey Juan Carlos.
- Frondel, M., Ritter, N., Vance, C. (2009) Economic impacts for the promotion of renewable energies: the German experience, Rheinisch-Westfalisches Institut fur Wirtschaftsforchung.
- Welsh Assembly Government Transport & Strategic Regeneration / MWTRA /Powys County Council. Powys Wind Farms – Construction and Use HGVs Study
- BWEA Representation: Draft TAN8 Consultation, November 2004
- Analysis of UK wind power generation Nov 2008 – Dec 2010. John Muir Trust