



# The Visual Issue

An Investigation into the techniques  
and methodology used in windfarm  
computer visualisations.

April 2007



# THE INTRODUCTION

Due to the growing and real threat of global warming, whatever the cause, the world is facing a major change in how we generate and use energy. Renewables will have to form a major part of this change.

There is now much debate about the use of wind energy as one of the main sources of generation, and it is the target of the Scottish Executive, for example, to achieve energy from 20% renewables by 2020. An admirable policy, but is there any need for our Government to allow this to be achieved by questionable means?

Whilst we may have seen wind turbines on the landscape throughout various parts of Britain, planning applications are now being lodged for a new generation of super-turbines. These turbines are in excess of 400 feet, and already, an application is in the pipeline for 500 feet turbines. So do we really know their true scale and their effect on our landscape? And how can we reasonably assess this?

This document does not question whether we should be developing windfarms or should not be developing windfarms, or even whether they look good on a landscape or are a visual intrusion on the landscape. We are simply addressing the methodology used by the windfarm industry, who in our opinion, have been using misleading methods for the last 11 years whilst seeking to obtain planning permission.

Having had more than 15 years experience in producing visualisations for planning applications, both here and in other parts of the world, what we see happening throughout Scotland and the rest of the UK is a method of visual presentation which brings our profession into disrepute. After many years of fighting for fairer standards, something has to be done because of the growing public perception that photomontage is unreliable.

This is certainly not the case in other parts of the world, where it is used as an accurate visual assessment tool which is fair to everyone. Since moving our business back to Scotland from Hong Kong five years ago, we have found that this is not the case here.

Inevitably, since we first became involved in the issue of Visual Impact Assessment photomontages for windfarm applications, it has been convenient for certain individuals and organisations, not only in the Highlands but throughout Scotland, to term our company as being opposed to windfarm development. This has been based on the fact that we have produced counter-photomontages on behalf of communities who feel they are being misled and are genuinely concerned about the real visual impact.

We have been employed by these communities as impartial Consultants.

Alan Macdonald *Dip Arch RIBA*  
*Registered Architect*  
*On behalf of Architech Animation Studios (UK) Ltd.*  
*29th April 2007*

# THE WINDFARM VISUAL ISSUE

## Part I: The background.

We first became involved in the whole question of windfarm visualisations in 1996, nearly eleven years ago. We were contacted in Hong Kong by the then Chairman of Brora Community Council in Sutherland who knew that our Company were specialists in producing images for Visual Impact Assessments relating to planning applications. There was a widespread feeling within the two adjacent communities of Helmsdale and Brora that they were being misled by the visuals for three adjacent windfarm sites which were to be the subject of a Local Planning Inquiry.

These visuals were in the form of wide panoramic strips with a field of view in excess of 90 degrees (equivalent to that of a fisheye lens) which diminished the visual impact of the turbine development on the landscape.

Interestingly, we had found out that in the original planning application, the visuals were presented as a full page single frame image taken with a standard 50mm camera lens, although taken in weather conditions not representative of the clear conditions normally associated with the Highlands. In some visuals, the turbines were hardly visible through the mist. However, although the single frame photomontages still somewhat under-represented the true visual impact, they did give a reasonable impression of scale and distance.

So why the sudden change from single frame images to wide, narrow panoramic strips which considerably reduced the visual impact of the turbines? Most intriguing of all, the developers claimed it was taken with the same camera lens. The focal length of a camera lens is defined by the angle of view contained within the image, which in the case of a standard 50mm lens is 40 degrees if measured horizontally. Yet, we were now looking at an angle of view which was in excess of 90 degrees. How could this be possible?

Although I did not attend the actual Inquiry and had returned to Hong Kong by this time, I soon found out. It was reported to us that the question of something called a '*viewing distance*' had become a major factor. Although we had been involved in creating visualisations for planning applications for over four years by then, we had never heard of such a viewing technique. It puzzled us for a long time.

So, over time, following project meetings in the Far East, if they happened to be attended by international landscape architects, we took the opportunity whenever possible to discuss the theory of the viewing distance with them. None had ever heard of it, and all found the logic behind it somewhat amusing and suspect. How, for example, was it possible to view the image from the '*exact*' distance in order for it to be accurate?

In the meantime, we were receiving further reports from the UK that the viewing distance was now becoming an important issue at windfarm Inquiries and witnesses acting on behalf of communities were being discredited because they did not know anything about the application of this science. We therefore began to suspect that the viewing distance could be a '*red herring*' to divert attention from the main issue. The developers' misleading panoramic visuals.

In view of this, we referred the matter to the Center for Visual Sciences in Rochester in the United States who are regarded as the world leader's in visual perception. They stated that such a technique could not accurately reflect what we actually see in a landscape situation using a standard camera lens for the following quite logical and straightforward reason:

Our perception of size is more related to the actual size of an object in the real world than to its size on our retinal image (a phenomenon known as size constancy). In a sense, the brain automatically takes into account the distance to an object to re-calibrate its perceived size. The problem with viewing

photographs of objects at a large distance is that our perception of depth is invariably shrunk because we are now looking at a totally flat image with no distance information. This effect is particularly bad in images containing large depth ranges in the order of several miles.

This always leads to objects at large distances appearing to be smaller in a photograph than in real life, even if one views the image at this so called viewing distance. Mountains therefore appear smaller in photographs than real life. The use of large foreground objects also serves to further diminish the size of distant objects.

This quite simply explains why our holiday snaps of mountains using our standard lens camera are always disappointing, exactly the situation I had experienced whilst photographing the Himalayan Chain at close range 25 years ago.

They were also of the opinion that viewing distance could be a '*red herring*'. It was therefore becoming obvious to us that this application of this complicated science was the invention of the British windfarm industry in order to reduce the impact of the turbines in their Environmental Statements. Put quite simply, how do you reduce the visual impact of an elephant in your garden? You take a photograph using the widest possible lens.

Since our return to the UK in 2002, we were contacted by representatives from several communities throughout the Highlands who felt that the visuals relating to planning applications for windfarm developments in their area were misleading.

There has been an unfortunate tendency for the windfarm industry to categorise people in these communities who question the visuals simply as '*objectors*'. This is certainly not our experience. We have found that these people have genuine and valid concerns about visual impact and believe that they are being misled, but feel that they have no voice. All they want to know is realistically '*how big*' and '*how near*' the turbines will be. These people, after all, may have to live with these developments.

In many cases, they have struggled to raise funds to produce counter-photomontages which they felt were more realistic when viewed from the relevant viewpoints. This was generally achieved by using the focal length of the camera lens and a single frame image. A simple straightforward photograph with the turbines superimposed. Their visuals were not accepted because they did not conform to '*Best Practice*'.

Planning authorities, the windfarm industry, The Scottish Executive and Scottish Natural Heritage have all been aware of the widespread concern about these misleading visuals for many years now. Understandably, therefore, many communities believe that their concerns, so often repeated, are simply being ignored.

\*\*\*\*\*

## Part 2: The problem with the Windfarm Industry’s visuals.

There is no way that a camera can truly replicate what we see. We view stereoscopically for a start and have the ability to see in three dimensions, whereas a photograph is monoscopic in nature and devoid of any distance information. But by a careful choice of lenses along with other factors, we can achieve a reasonable approximation.

Whilst a 50mm lens is called a standard lens because it generally represents what we see within our main area of visual awareness, the choice of lenses for Visual Impact Assessment purposes requires much more careful consideration.

For any planning application, it is essential to provide the viewer with sufficient visual information so he can form a realistic sense of size and scale of the proposed development. The choice of lens to form a photographic backdrop for a photo-montage really depends on the subject matter and the number of known references contained within the photographic frame. By known references, we mean things that we see every day of a ‘known scale’ i.e. buildings, vehicles, people etc. So in an urban setting where there may be many such references, the scale of a development can easily be assessed even if a wider angle lens is used. In other words, we use our own brain to form a sense of scale.

In a landscape context, the situation can be very different. Photomontages of turbines are often shown on bare hillsides at a considerable distance with no features or known scale references. Because we are now looking at an image on a flat plane, we have no real idea of true distance for the reasons explained by the Center for Visual Sciences. Whilst we know by everyday experience the approximate height of a two storey house and can therefore reasonably gauge its distance within a landscape, it is different for wind turbines. There are no identifiable scale references because of their simple shape and form. So when we view an image, we simply do not know if the turbines are 100ft high, 200ft high or even 400ft high. We simply have no means of visually scaling them in our own brain.

We therefore have to rely on an impression of distance to give us a sense of scale, and this can only be achieved by using the focal length of a camera lens. The wider the angle of view of a camera lens, the further away an object appears, the narrower the angle of view, the nearer an object appears. The basic science of photography since the camera was invented.

Quite simply, when we stand at a particular viewpoint.....



*will the turbines look this near?.....this near?.....or this near?*

With further research using computer analysis, we discovered that the developers’ photomontages, as interpreted by the public, actually reduced the real visual impact by up to a factor of three, with certain applications exceeding this.

\*\*\*\*\*

So why is a viewing distance considered necessary at all? There is professional consensus outside the windfarm industry that single frame images printed full size at A3 or A4, taken within the range of a 70mm to 80mm telephoto lens provides the viewer with a realistic impression of scale and distance in a medium to long range landscape situation when viewed at a normal reading distance.

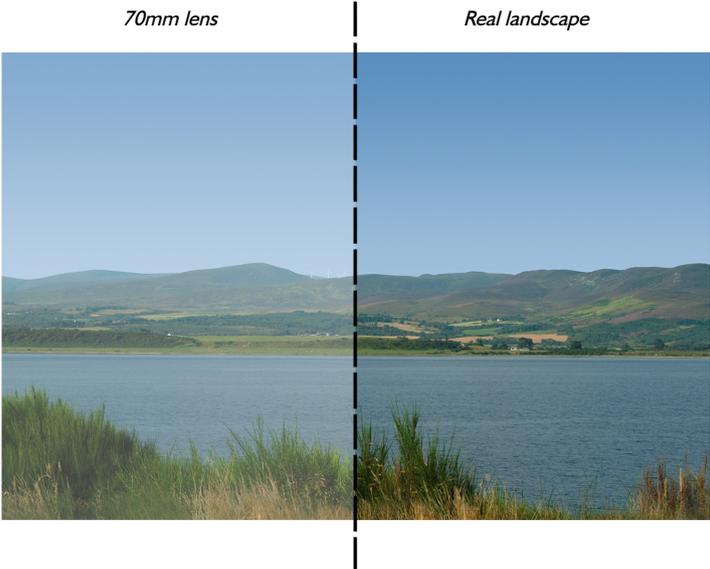
SNH's own Guidelines on the Environmental Impacts of Windfarms and Small Scale Hydroelectric Schemes identifies "a telephoto lens of around 80mm as more truly representative". Documents published by the Welsh Assembly who have had much experience in this area state "that a more accurate impression of the perceived view is recorded using a 70 to 80mm focal length lens".

This has also been our own experience in the field and confirmed by local people seeking a more realistic image. There are quite straightforward reasons for this:

The problem with using a wide angle lens in any situation is the fact that the foreground looks much bigger in relation to more distant objects than it does in reality. This is clearly evident in the images shown on the previous page. But if we look through a single lens reflex camera fitted with a 70mm telephoto lens and 'split-screen' it with a real landscape, you will find that the images are identical in terms of vertical scale. (*This can be done by turning the camera sideways, relaxing the eyes, and viewing through the viewfinder with one eye whilst viewing the real landscape with the other*).

This is especially important if we are assessing the visual impact of more distant objects. In other words, it is similar to the focal length of our own eye. However, at this stage, we are still looking at a view containing 3D depth information.

Once the image is printed onto a 2-dimensional flat plane, there is a shrinking effect of the more distant hills because there is now no distance information within the photograph, but this can be compensated for by slightly increasing the focal length of the camera lens. Printed as a single frame photograph, it gives the ordinary member of the public a realistic representation of what they see in terms of scale, distance and vertical proportion from a given viewpoint.



*When a 70mm lens is 'split-screen' with the real landscape, the images are identical in terms of vertical scale.*

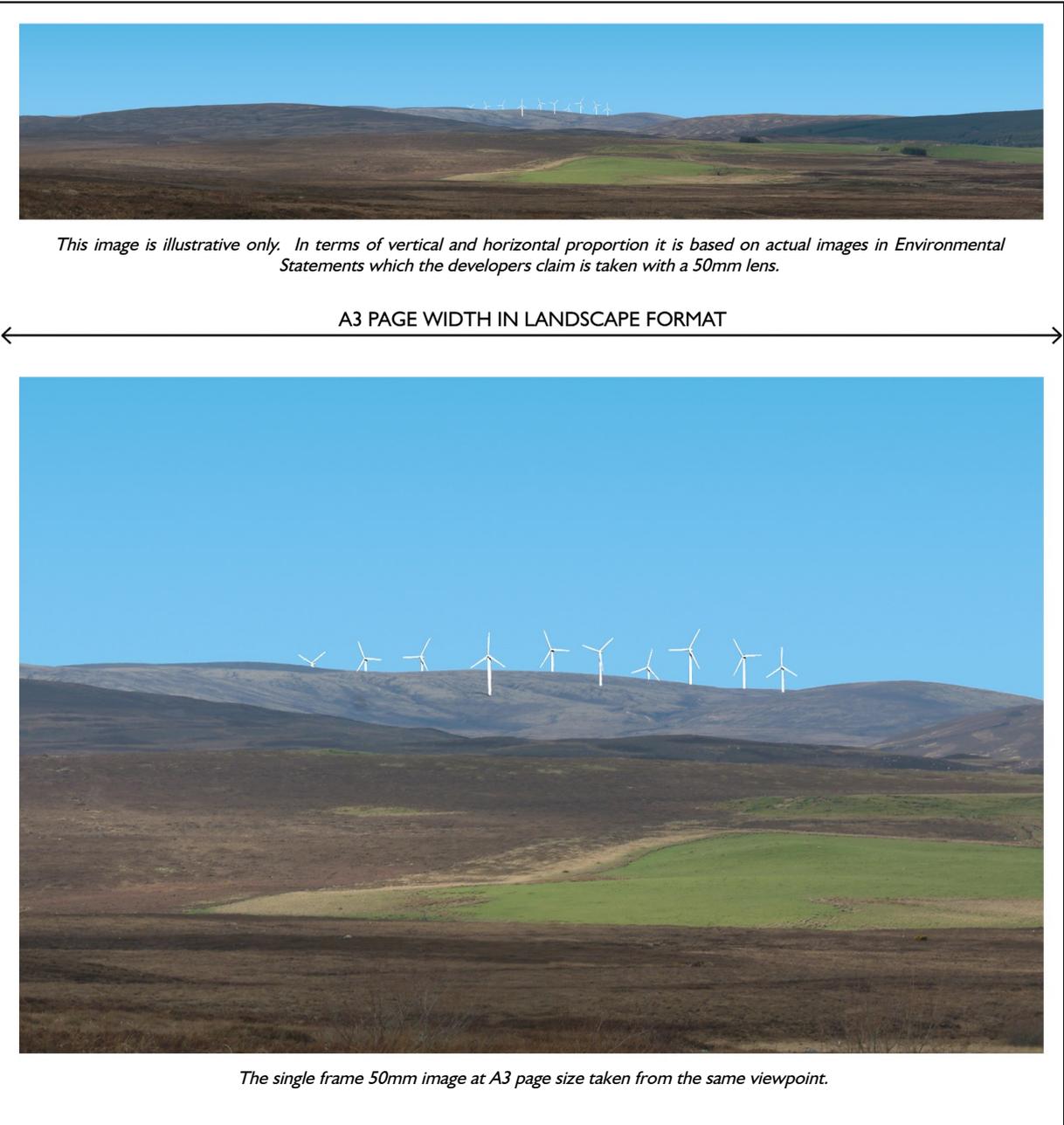
*This graphic is illustrative only.*

### Part 3: Why the images are misleading the public.

The example below is **purely** for illustrative purposes and clearly shows the main problem.

The top image is based on the techniques used by the windfarm industry which they claim is taken with a 50mm lens, the lower image is also taken with a 50mm lens from exactly the same viewpoint.

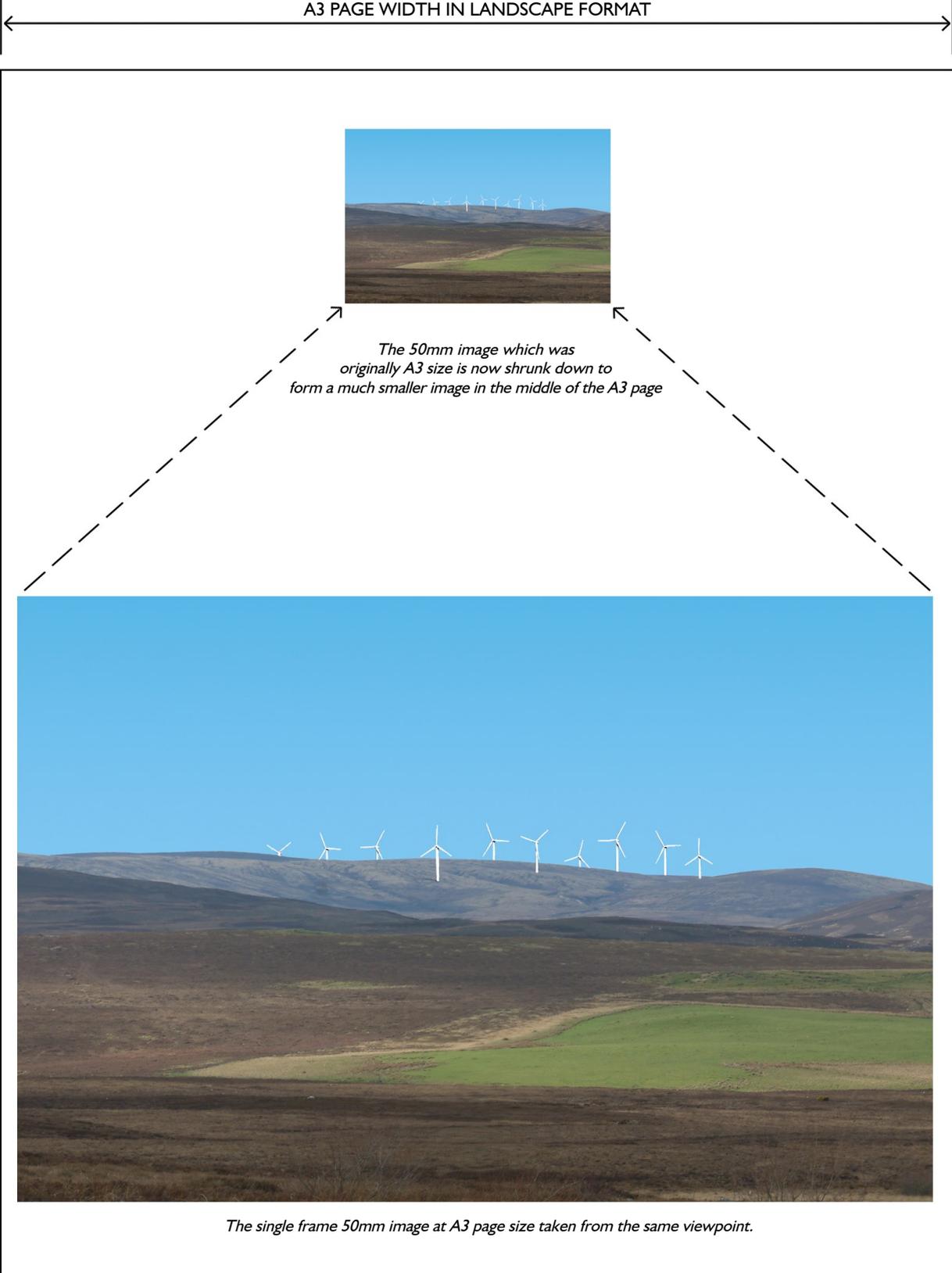
*(Whilst in fairness to certain consultants where the contained angle of view is less, the top image is based on the proportions of photomontages we have actually seen in Environmental Statements. It should also be pointed out that whilst both images would be printed full width A3 in landscape format, it clearly shows the comparative difference between the two).*



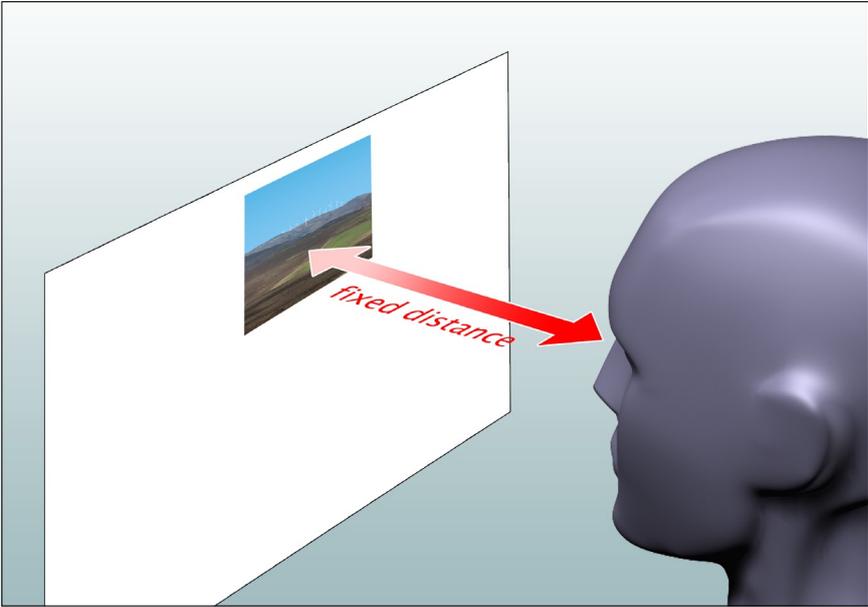
The top image looks much further away than the lower image, yet they were taken with an identical lens. Why is there such a huge difference?

The answer to that is quite simple. It is because of two essential pieces of information which the developers do not make clear.

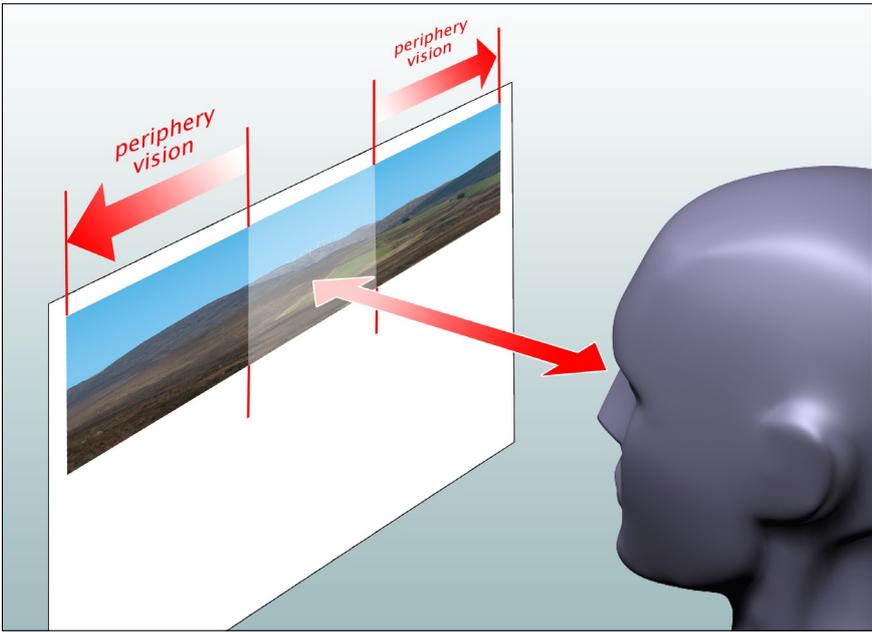
The developers claim that the image had been taken with a 50mm standard lens is correct, but what they do not make clear is the fact that the full frame A3 image is now shrunk down to form a much smaller image in the centre of the page.



There is now a second piece of essential information which is not made clear. This reduced central image should now be **viewed from a fixed distance only**.



When this image is now viewed at this **fixed distance**, in order to create an impression of *'periphery vision'* which the developers insist is necessary for landscape assessment, they add several additional photographs on either side to extend the image into a wide panoramic view.



Whilst the image above shows the panoramic image as a flat plane, it should be noted that to be technically correct, it should not only be held at the *exact* distance, it should also be viewed as a curved image as the photomontage itself is made up of many different photographs. The exact curvature should be the same as the arc or rotational movement of the camera itself whilst capturing these images.

From the Environmental Statements we have examined, this image now has an overall angle of view of anything up to 90 degrees (*or beyond in some cases*), which is where the two main problems associated with how the public interpret of these images occur.

When we view any photograph, unless it is made specifically clear, our brain naturally assumes that the image represents what we would see from the particular viewpoint if we were actually there.

Because the public are now viewing display boards at a distance or viewing the actual Environmental Statements on a desk or lectern, they are unaware of the importance of this critical viewing distance.

So Instead of viewing the image close up to the eye at a fixed distance with periphery vision (*image A below*), they are now viewing the much wider image which is now within their area of sharp vision, making the turbines look much further away (*image B below*).



*Image A*



*Image B*

Whilst the windfarm industry may argue that a viewing distance is specified, it is generally stated in small print along with other technical data on the page. Even if it is noticed by the ordinary member of the public which in most cases it is not, it does not mean anything to them. They naturally assume that this technical data is for the 'experts'. They do not have to use a viewing distance to understand an image in a newspaper, view photographs or to even understand the images they see on television, so why should it mean anything to them?

If the windfarm industry were truthful, then there should be a clear notice on the image page stating that '*This image can only be accurately assessed from the correct viewing distance*'.

This visual confusion is now further compounded by the second main problem. As the public view the images in their local library or council office, they find the long panoramic images confusing because they are unlike any format they are used to. Their holiday snaps are generally within a 3 x 2 format which they readily understand, but these images are long narrow strips which appears to them to be a wide angle photographs cropped top and bottom. Because they know their own locality intimately, the images look much further away from the actual viewpoints than they remember, but they cannot work out why.

If they query the images, they are simply told that they conform to Best Practice.

If these images are taken with a 50mm lens as the windfarm industry claim, then we would have to be three times further back from the actual viewpoint to obtain the field of view of the image the public sees. If, as we believe, a 75mm to 80mm lens is more representative of the true scale and distance within a medium to long range landscape situation, then we would have to be four times further back from the viewpoint. A graphic to illustrate the characteristics of the different lenses is attached in Appendix 1 at the back of this report.

Whilst the developers claim that the images are taken with a 50mm lens, in reality, because they are made up of many different photographs to make up a contained angle of view of 90 degrees, it is really irrelevant what focal length of lens is used. The result will simply be the same every time.

If the field of view of a straightforward 50mm photograph is extended by adding additional photographs, it no longer has the characteristics of a 50mm lens, so such a claim is meaningless. By extending the field of view to 90 degrees, it now has the characteristics of an ultra-wide angle lens.

For Council members and even Statutory Consultees who may not be familiar with the landscape in question, the overall effect considerably diminishes both the grandeur of the landscape and the impact of the development in question.

\*\*\*\*\*

So what about the practical application of this viewing distance? In most cases, this critical viewing distance is around 25cm. There is immediately a problem here as to more elderly people, this measurement is meaningless as they tend to still think in feet and inches.

If for example, the distance to the nearest turbine is 10 kilometres which is quite common in these visuals, then a distance of 2.5cm (one inch) represents one kilometre.

Over many years, using friends and other professionals, we have carried out many tests to establish if a viewer could hold these reports at the exact distances specified in various Environmental Statements. No one was even near. In all cases it was held much further away so they were, in effect, up to several kilometres further back from the 'virtual viewpoint'. We also found that because of the natural deterioration in our eyesight as we age, older people tend to hold the image much further away in an attempt to try and focus clearly.

The technique is flawed and an unreliable method of accurate Visual Impact Assessment. Yet, the windfarm industry's sole justification for producing these visuals which are misleading the public is based on this viewing distance technique.

## **Part 4: The University of Newcastle Report.**

Because of the widespread criticism of the visuals contained in windfarm Environmental Statements, not only throughout the Highlands, but throughout the whole of Scotland, in 2001, Scottish Natural Heritage (SNH) formed a Steering Group with a view to establishing better and more consistent standards for visual impact assessment.

The University of Newcastle were subsequently contracted by SNH to undertake a Study under the leadership of Professor Benson, the Head of their Department of Architecture, Landscape and Planning, a totally impartial and eminent man.

The study compared the pre-planning visualisations and the built reality of eight windfarms across Scotland built between 1995 and 2001 and assessed 70 different viewpoints. His findings confirmed there was in fact a considerable discrepancy and questioned many of the photomontage techniques adopted by the windfarm industry. It concluded that the viewing distance in the visuals he had investigated were a strain on the eyes, failed to capture any semblance of realism, and under-represented the true visual effect.

Apart from also identifying the very different requirements of Landscape Assessment and Visual Impact Assessment, amongst the final recommendations for photomontages, he stated that a natural viewing distance of 30 to 50 cm was necessary, and that "*a full image size of A4 or A3 for a **single frame picture**, giving an image height of 20cm is required to give a realistic impression of reality*". (This, in reality, represents a full size A4 print).

He did not however, investigate or question the scientific basis on which the viewing distance with specific application to assessing the impact of windfarm developments within landscape was based,

nor did he explore visualisation techniques for planning which were well developed in other parts of the world.

Generally, the report gave us encouragement as some of the main problems appeared to have been identified and there was hope that a new and fair guidance would result.

\*\*\*\*\*

The windfarm industry meanwhile, continued to submit their panoramic images on the grounds that they conformed to Best Practice. So early in 2004, we wrote a letter to the Planning Department of the Highland Council and asked for a copy of this Best Practice. They informed us that it was based on the '*Guidelines for Landscape and Visual Impact Assessment*' published by the Landscape Institute and the Institute of Environmental Management & Assessment.

We obtained a copy of this publication and found that these guidelines did not justify the techniques adopted by the windfarm industry. They **do** however emphasise, very clearly, the importance of predicted effects being properly understood by the public and the relevant competent authority. However, there was not a mention of the application of a viewing distance as an accurate means of Visual Impact Assessment.

So in August 2004, we again wrote the Planning Department pointing out that the guidelines they referred to did not have any information on the application of a viewing distance, and could they provide the necessary documentation, standards and guidelines on how this technique was created, applied, calculated and authorised. They confirmed that they were not in possession of any information on the subject.

Meanwhile, communities who produced more realistic photomontages using the single frame method as recommended by Professor Benson continued to have their visuals rejected on the grounds that they did not conform to Best Practice.

It has been our observation during planning hearings which our company have attended over the last few years, no member of the Highland Council Planning Committee assessed these visuals at their specified viewing distance. They viewed the visuals at a normal reading distance as anyone else would do, confirming Professor Benson's similar observations. They were therefore making a major planning decision on images which underestimated the true visual impact.

\*\*\*\*\*

It should be noted that in early 2004, Perth and Kinross Council tried to address the problem in their own Guidelines, recommending single frame images printed full page on A3 or A4. Later that year, in their report relating to a windfarm development at Drumderg, they noted "*the photomontages presented in the statement are based on wide angle views in mixed weather conditions and give a less than accurate impression of the precise scale and likely impact of the turbines in the landscape*". This attempt appears to have been disregarded.

\*\*\*\*\*

Regrettably, Professor Benson died in March 2004 before he could take his initial findings and recommendations forward. SNH, instead of appointing another totally impartial academic to lead the work, contracted it jointly to two members of their original Steering Group, a former employee of SNH, and a director of one of the few companies involved in producing the visual techniques which were criticised by Professor Benson.

The purpose of the study was to produce standards which were '*fair to all*'.

The Steering Group itself was restricted to representatives of the Windfarm Industry and their Consultants, SNH staff and a representative of the Scottish Society of Directors of Planning, the Highland Council's Director of Planning and Development. His role was to represent the public authorities and the public interest.

Independent Consultants who had produced single frame visuals as recommended by Professor Benson were excluded from the process. In our own case, it was only by continual correspondence with the Highland Council and their responses which made us aware of what was happening. Representatives from communities affected by the windfarm developments who had expressed concern about the misleading visuals were also excluded.

In our opinion, there is, at the very least, a conflict of interest involved here.

## **Part 5: The scientific validity of the viewing distance.**

During Architech's on-going research into the problem with the visuals and how the public was translating them, we found out that the viewing distance used by the windfarm industry was derived from methods used by fine artists over many centuries, long before photographic film was invented. These artists used a technique called '*camera obscura*' which means a darkened room or box with a hole through which the image of a space could be projected to form a picture on the opposite wall which they then traced onto canvas in order to obtain the correct perspective relative to the artist's viewpoint.

It is particularly associated with artists of the Delft School such as Vermeer and Fabritius whose domestic interiors included extensive chequered tiled floors. But whilst it provided the geometry for calculating the perspective of the artist's viewpoint in relation to the space to be captured on canvas, it provided no '*absolute*' scale in terms of the real world. The space could be an interior of a doll's house, or could equally be a huge vast room. It was only the '*known*' objects within the artist's view such as furniture, objects and people that provided the viewer with a true sense of scale and distance of the scene itself.

In the case of the windfarm visuals, there are no identifiable and scaleable features on the turbines themselves or generally within the photographic image to form a realistic impression of their actual size. The adoption of the technique in this context is therefore fundamentally flawed from the outset.

No one within the windfarm industry or their consultants have been able to provide us with scientific evidence for the *specific* application of the viewing distance in the assessment of windfarm developments within a landscape. However, following a Planning Hearing in the Highlands in April 2004 where our single frame counter-photomontages were rejected by both the developer and the Highland Council on the grounds of not conforming to Best Practice, we persistently asked the developer in question to produce this evidence. Despite several reminders over a period of three months, it was only by copying my correspondence to the Director of Planning and the Convener of the Highland Council that we eventually elicited a reply.

We were referred to a comprehensive manual by an eminent expert in the field of camera lenses. As the cost of this publication was over a hundred pounds, we obtained a copy on loan from the Central Reference Library in Edinburgh. Contained within hundreds of pages of highly technical and very detailed scientific data on the characteristics of camera lenses was a small section occupying less than half a page on viewing distance. It contained no information with specific reference to landscape assessment.

Our Company then contacted the Author directly. It is our understanding that his paragraph referring to viewing distances was a hypothesis based on the methods originally used by fine artists for perspective purposes which he never fully developed. In his publication, he states that *“the correct viewing distance criterion is seldom observed for photographic images, prints being viewed at a convenient distance”*.

Yet, here was the windfarm industry with a highly developed and complex science based on this same viewing distance taken from this totally unrelated application. Factors such as the correct ratio of *‘ground to sky’* were even being mentioned. Only a *‘very limited number of companies in Scotland’* had the necessary qualifications and skills to carry out such exacting work we were informed, inferring that our company did not have the necessary expertise. Even allowances for the *‘curvature of the earth’* came into it.

## **Part 6: The windfarm industry’s changing tactics.**

Since we first raised questions relating to the visuals contained in the Environmental Statements, the windfarm industry have simply been adapting their tactics in defence of their technique.

Although the viewing distance was a crucial issue a few years ago, since we questioned the validity of the science in this application, it has been quietly dropped by the windfarm industry as a disputed issue at planning inquiries.

Following that, the windfarm industry changed tack by claiming that the visuals were only *‘tools to be used in the field’*. As these Environmental Statements are between one and two hundred pounds to purchase, the cost is beyond most people in any small community. The only way that they can view these documents is usually in the local library or Council Office where it cannot be removed or loaned during the public consultation period. So how is it therefore possible for a member of the public to view the visuals *‘in the field’*?

Whilst the windfarm industry may argue that the visuals are also available on CD-ROM at a lower cost, the visuals contained in the CD-ROMs we have seen are often of poor quality with turbines hardly visible, and in some cases the viewing distance is not specified. As few people have A3 printers, it is likely that the wider images will simply be viewed on a computer screen. Given that the sole justification for these misleading visuals is based on this critical viewing distance, this quite simply makes a nonsense of the accuracy of the technique.

Since we raised this particular matter, the windfarm industry has changed tack yet again. During a recent windfarm Inquiry in Perthshire, they now claim that their visuals are for *‘professionals only’* and not for members of the public who are not competent to interpret them. If this is the case, then why has this not been made perfectly clear in the Environmental Statements which have been misleading the public for over a decade now?

It is a flawed assessment system which has remained unquestioned. The heights of the latest generation of turbines now exceed the average height of skyscrapers in Hong Kong. As structures of this height are alien to the Scottish rural landscape, a realistic impression of distance and scale is therefore vitally important.

After five years, we have just come full circle and back to the whole problem which Professor Benson clearly identified as one of the main areas of confusion and conflict. The failure of the windfarm industry, their consultants and SNH to recognise and distinguish the different requirements of Landscape Assessment and Visual Impact Assessment.

## **Part 7: The new SNH Draft Guidance.**

### **The Draft Guidance Document**

After much cost to the taxpayer over a period of three years, the SNH Draft Guidance was circulated for comment in July 2005.

The Guidance was derived from the work of Professor Benson, however the authors had gone back into the basic principles of the existing methodology, a process which was informed by a series of consultation workshops and a paper consultation on the draft document. The contributors were almost exclusively stakeholders; windfarm developers, their landscape consultants and graphic practitioners. There was also one workshop for Planning Authorities at which nine Councils were represented.

The concerned public were never consulted, nor were their views canvassed or encouraged. As far as we are aware, only three outside parties including ourselves contributed their comments during the process. In our view, the public interest was not sufficiently represented.

In terms of the public requirement for accurate and understandable visuals in order to assess visual impact which is of particular concern to us, the document started from the premise that the public had simply misunderstood the limitations of past visualisations and how they should be used. They claimed the common technique of long narrow panoramas with short uncomfortable viewing distances was mathematically sound but “*tended to be used incorrectly*” by people.

The technique itself was not questioned however, nor was the use of viewing distances in this landscape context. We also observed that retrospective justification made it almost impossible for the viewing distance technique to be abandoned by the authors, despite the fact that it had been proved to be unreliable in its practical use and was a source of under-representation.

We found that the document was bogged down in technical detail and complexity which obscured the much more important questions relating to accurate visualisation for Visual Impact Assessment. Complexity appeared to us to have become a form of specialist protection. Professor Benson's recommendations had been selectively adopted, his recommendation regarding single frame images was not mentioned, and the requirements of different audiences, although recognised, was left to the good judgement of the applicants and their consultants in consultation with SNH and the Planning Authority.

### **The Final Good Practice Guidance Document**

The new SNH ‘*Visual Representation of Windfarms: Good Practice Guidance*’ was finally published in February 2007. It is a glossy and expensive document with numerous colour illustrations, photographic and photomontage examples, yet still dominated by complex detail.

The more natural viewing distances and increased image heights as recommended by Professor Benson, now dictate and dominate the increasing size of the panoramic visualisations and the implications of printing photomontage visualisations at A1 or A2, and how these can be best contained within an A3 Report format.

Larger visualisations do not, in our view, solve the problem, although we recognise that more detail is welcome and there will be a some consequent reduction in the level of under-representation.

New minimum standards will involve taller panoramic images of 13cm, and more natural viewing distances of between 30 and 50cm which, as a result of printing constraints, are likely to become the

most common practice. We have studied the visuals for a recent application which results from the new Guidance where these minimum acceptable standards have been applied. The images are 13cm high with a viewing distance of 30cm. Whilst, there is some improvement in terms of the distancing effect, the local community still claim that the visuals simply do not represent what they see.

Whilst the thrust of the final document remains the same, there are some significant changes, particularly regarding the question of single frame images. Professor Benson's very clear recommendation in this respect has been reinterpreted to mean something different. Our natural familiarity with 3 x 2 standard photographs is questioned in the light of modern technology rather than recognising the long history of this format and our natural field of sharp vision. We consider this very regrettable, as it undermines the intellectual rigour and credibility of the document itself. This is particularly the case in the light of the consultation input of the Steering Group's own spatial data specialist on these subjects.

The visuals are still considered to be *'tools to be used in the field'* despite the obvious practical difficulties. The Guidance is sensitive about the suggestion that a select number of visuals could be included in the Non Technical Summary which is generally supplied free of charge. There are concerns that such visualisations *"may be misused or misunderstood by the public due to the lack of accompanying information that is found within the main ES"*.

From our experience, local people do not need wide panoramas with fixed viewing distances or expert Landscape Analysis to assess a development within their own locality. They do not need wider context of the visual resource because it is in front of them every day. They are already intimately familiar with their landscape, its special views and favourite spots in changing weather conditions and all seasons. This fact is not clearly recognised, and we can therefore only conclude that single frame images printed at full A3 or A4 size and included in the free Non-Technical Summary is just too simple, accessible and realistic. Additionally, there is the fact that such single frame images taken at the appropriate focal length *do not* require a defined viewing distance. They are just simply viewed at a comfortable reading distance.

The document makes clear that the Guidance has been written for landscape architects and expert assessors. In our view, it fails to make the proper distinctions between visual techniques for Landscape Assessment and Landscape Impact Assessment on the one hand, and visual techniques for the inter-related but distinctively separate area of Visual Impact Assessment on the other, as clearly identified by Professor Benson.

In his University of Newcastle Report, he states that although visual impact assessment is an integral part of landscape and visual assessment, it is *"as much a matter for people as it is for professionals"*, and that the two separate requirements should be clearly distinguished. He goes on to state that *"if viewpoints are also used as any part of any landscape assessment, this should be clearly distinguished from the visual assessment"*.

Whilst we recognise that some of these distinctions may overlap for landscape architects, there is no overlap for the public. The Guidance makes a strong point that there is no *"one size fits all"* solution. In current practice, this is the fundamental root of the existing problem as one photographic and photomontaging technique is being used for **all** assessment purposes. Members of the public require a different solution and they should not be confused by the complicated format which professionals may feel is necessary for other purposes.

The University of Newcastle Report was completed in a period of three months and clearly identified the main problems to be further addressed in the way ahead. In his final conclusion, Professor Benson stated *"the increasing development pressures for windfarms require that visual impact assessment is approached in a comprehensive, explicit and systematic way and that the inherent complexity, controversy and uncertainty are addressed"*. His report was published in 2002 and yet five years later, little has changed.

For any Best Practice which relates to planning to be credible, the predicted effects must be properly understood by the public. The standard response that visualisations conform to Best Practice is not enough, and the Guidance fails to recommend a simple uniform comprehensible standard for the general public.

\*\*\*\*\*

Under the Freedom of Information Act, we have also established that the Scottish Renewables Forum (SRF), who represent the windfarm industry, have not only paid for three workshops held in Edinburgh, they have also controlled the list of attendees during this important consultation process. It is also proposed that SRF will provide a major part of the funding for the publication of the new Guidance document itself.

This clearly indicates to us that there is collusion between SNH, the windfarm industry and their consultants in which the public interest and concerns have been suppressed or overlooked.

For those who wish to look at Professor Benson's University of Newcastle Report, it can be found buried amongst *Commissioned Reports* in the Publications section of the SNH website. It is number 34 and identified purely as '*Visual Assessment of Windfarms: Best Practice*' with no date or any other information. The resulting 2005 Draft Guidance with the '*paper*' consultation comments can also be found under *SNH Guidance, Renewable Energy* subsection *Renewables Guidance & Advice*, section *Wind energy*.

\*\*\*\*\*

It has taken SNH an unacceptably long time to complete the Guidance which has, in our professional opinion, failed to address the essential and fundamental issues clearly identified by Professor Benson who laid the foundation blocks for a fair and balanced guidance to meet the requirements of the windfarm industry, their consultants, the general public, planning authorities and planning committees.

During that time many windfarm planning applications have been submitted and passed.

The new Guidance aims to become the adopted reference for all future visualisations relating to windfarm planning applications and we consider that SNH are sanctioning a flawed technique which will continue to confuse and exclude the public. Photomontages for Visual Impact Assessment in any planning application simply require applied common sense to give people and planning committees an image they can clearly understand. This would then give them a realistic idea of scale and distance and therefore help address fundamental questions as to '*how big*' and '*how near*' a windfarm development will be. That is all the public want to know.

That is the purpose of an Environmental Statement.

## **Part 8: The purpose of Visual Impact Assessments.**

The use of Visual Impact Assessment as part of a planning application is sadly relatively new to Scotland. In other parts of the world, it has been highly developed for many years to ensure proper planning control and forms an essential part of the planning process.

Over a fifteen year period during which our company have produced photo-montages worldwide for Visual Impact Assessments, we have never had one single complaint of misrepresentation of visual impact. Such a claim cannot be made by the windfarm industry. Over a period of 11 years, we have found that the main complaint from local communities throughout the Highlands relates to the fact that the developers' images underestimate the visual impact of the wind turbines.

The inference by the windfarm industry that the visuals can only be undertaken by experienced landscape architects has no foundation whatsoever. Whilst the written interpretation of the visuals may require that input, the preparation of the visuals themselves do not.

There is no complex science involved, it is a matter of common sense and experience. Provide the viewer with enough visual reference material so he can form a proper sense of scale for himself. The images themselves should consist of a single photographic frame, the format the public can readily understand, with the lens specified.

There are also no established set procedures or any particular qualifications required in planning photomontage, it is gained by experience and is self-regulatory. Whilst it may be convenient for a developer to underestimate the true visual impact in order to obtain planning permission, any misrepresentation will be revealed once the development has been constructed.

If, for example, we produced a photomontage as part of Visual Impact Assessment for a planning application in the Far East which showed a development at a height of 15 stories, but the development when built was 45 stories, there would be serious legal repercussions. It has certainly been our experience over 15 years that if an Environmental Statement is submitted as part of a Planning Application, the decision to approve or not approve the development by a planning committee is largely based on the images contained within that statement.

What is happening with the windfarm developers montages is no different, but instead of reducing the heights of the turbines on the actual photograph, the developers reduce the visual effect by making the turbines look between three to four times further away from the actual viewpoint in terms of the public's interpretation of the images.

The result of this viewing distance and how it underestimates the true scale and visual impact of these windfarm developments was clearly evident in Caithness with the construction of the Causeymire Windfarm Development. There was no widespread concern at the time of the planning application and public consultation stages, simply because the public had assumed that it would not have a serious visual impact. Their assessment was based on the visuals as presented in the Environmental Statement and the way that they had interpreted these images.

It was a somewhat different matter when they were constructed. The widespread reaction was one of much anger. The windfarm industry have been aware for many years that the public have been misled by these visuals.

We understand that the recent windfarm constructed on the Braes of Doune near Stirling has evoked a similar response.

This discrepancy between the visualisations and the built reality was exactly what Professor Benson had highlighted in researching his University of Newcastle Report. In the new '*Good Practice Guidance*' now published by SNH, this issue is not even addressed.

\*\*\*\*\*

The Visual Impact Assessment contained within any Environmental Statement is an integral part of a legal planning application. These Environmental Statements are **public consultation documents** and are not for 'Professionals only' as the windfarm industry now claim.

The primary purpose of the visuals is to provide the public and members of planning committees with images which give them a proper sense of size and scale regardless of the nature of the development so they can make a properly informed judgement for themselves. In the case of wind turbines, it is their **ONLY** means of assessing the visual impact. The question of whether to finally approve or not approve

a planning application is not made by a panel of *'professionals'*, it is decided by an Inquiry Reporter or a Planning Committee which is made up of elected members of the general public.

Whilst the windfarm industry claim that it is necessary to show the landscape in its wider context for landscape assessment by professionals, then these visuals should be contained within a separate section of the Environmental Statements, or better still, in a totally separate document so there is no further confusion for the general public.

In the University of Newcastle Report, Professor Benson identified that although visual impact assessment is an integral part of landscape and visual assessment, it is *'as much a matter for people as it is for professionals'*, and that the two separate requirements should be clearly distinguished. He goes on to state that *"if viewpoints are also used as any part of any landscape assessment, this should be clearly distinguished from the visual assessment"*.

It is very pertinent to note that in instances where our company have produced single frame counter-visuals for local communities, they have been rejected by the windfarm industry on the grounds that the visuals did not conform to Best Practice. Yet, they have claimed that both their visuals and our visuals were exactly the same when viewed from their respective viewing distances.

If this is the case, why do the images relating to Visual Impact Assessment in these Environmental Statements not just consist of a single frame image as recommended by Professor Benson in the first place? This is all that members of the public are asking for.

After all, this is how the windfarm industry presented their visuals before 1996.

Why, therefore, is it necessary for affected communities to continue struggling to raise funds to produce counter-visuals which they feel are more representative of what they really see, when this could so easily have been provided in the first place free of technical gobbledegook which conveniently diminishes the true scale of the turbines?

It is also disturbing to find out that the SNH's new Guidance refers to a single frame image as a *'telemontage'*, a term invented by the windfarm industry. If the image is correctly executed, it should only represent what we see in terms of scale and distance. The term *'telemontage'* infers that the image is somehow zoomed in, so this terminology should be dropped immediately.

## **Part 9: The viewing distance in other applications.**

The methodology is now not only restricted to windfarm developments. The visuals used in the Environmental Statement relating to the Beaulieu to Denny Transmission Line Upgrade utilise the same technique based on a viewing distance.

Whilst there is a case for also having extended panoramics because of the linear nature of the transmission line itself for landscape assessment, there are no separate visuals to give the public a true sense of scale and visual impact of the pylons themselves from the selected viewpoints as required in the Visual Impact Assessment of an Environmental Statement.

Although we have not been asked to comment on the visuals relating to the pylon line planning inquiry, the visuals we have looked at do not represent what we see from the actual viewpoints. In a similar manner to the windfarm planning applications, the visual impact of the pylons have been reduced in terms of the public's perception of visual impact, and this is further complicated by the fact that viewing distance of 21.8cm is impractical for assessment purposes.

In the University of Newcastle Report, Professor Benson identified that a viewing distance within this range was *“a strain on the eyes, difficult or impossible to use and fails to capture any semblance of realism. Because most viewers will in practice observe these images from longer distances, a subtle but powerful underrepresentation of the visual effect is introduced”*.

How is it therefore possible for the public to assess the true visual impact?

## **Part 10: Conclusion**

After nearly eleven years of research into this issue, it is our considered opinion that the legality of the windfarm planning applications we have personally viewed over that time have to be brought into question.

In the planning applications we have looked at, apart from the distancing problems created by the viewing distance and the way the public have been interpreting these visuals, we have not, to date, been provided with sufficient evidence that this is a scientifically proven technique for the Visual Impact Assessment of windfarm developments within a landscape.

Further, that whilst the developers have claimed in their planning applications that their visuals conformed to Best Practice, we have similarly not been provided with sufficient evidence that such standards existed at the time of the applications to justify the visuals as presented within their Environmental Statements.

If a Sutherland crofter can have his planning approval repealed for making a misleading statement in a planning application, why should the windfarm industry be exempt? If a developer is similarly found to have provided misleading information either in the form of a visual statement or a written statement, then planning permission should be automatically repealed. If the windfarm has already been built, then the developer should submit for retrospective planning permission in the same way as any other applicant.

Setting an example would in itself ensure that the windfarm industry provide more acceptable visuals, not only for communities who are potentially affected by windfarm developments, but also for planning committees to enable both parties to make a fair and properly informed judgement for themselves.

We would emphasise that Architech have not being paid by any individual or organisation in researching this issue over the last eleven years. As an experienced company who have specialised in producing images for Visual Impact Assessments for planning applications in both urban and rural situations for fifteen years, we simply cannot sit back and watch what we consider to be an unacceptable abuse of the planning system and where the genuine concerns of ordinary people are simply being ignored.

\*\*\*\*\*

It is our understanding that over 200 applications have been made or are now in the pipeline for windfarms throughout Scotland. How can we reasonably assess which sites are the most suitable when members of the public and planning committees are not being given a fair and realistic impression of visual impact?

Whilst recently seeking permission from SNH to quote from Professor Benson’s University of Newcastle Report, it was made clear that it should only be referred to as an unpublished document and that it was only contributory advice leading to their new Guidance. A copy of the front page of Professor Benson’s original document is attached in Appendix 2. The title clearly states *‘Visual Assessment of Windfarms: Best Practice’* and goes on to state that the report should be quoted as the *‘University of Newcastle (2002) Visual Assessment of Windfarms Best Practice. Scottish Natural Heritage Commissioned Report F01AA303A’*.

Since its publication, the University of Newcastle Report has been referred to as a source of Best Practice in windfarm planning applications and is also quoted in the Environmental Statement relating to the Beaulieu to Denny Transmission Line Upgrade.

The majority of windfarms studied by the University of Newcastle Team had a turbine height of 55 to 65 metres (180 to 213 ft) high. By the time it was published in 2002, the general turbine heights had almost doubled in size to around 120 metres high. Now, in 2007, turbines of over 150 metres (almost 500 ft) are being applied for. It is therefore clear that a solution for providing honest and realistic visualisations for the public must now be a priority.

\*\*\*\*\*

As publicly funded Guardians of our Landscape, SNH have a duty to undertake any major study in a balanced, democratic and totally transparent way. In our professional opinion, they have seriously failed in that responsibility. Given the proliferation of windfarm applications now in the pipeline, that responsibility should now be passed to a more competent and neutral authority as soon as possible.

Over the last decade, letters from the general public in response to various applications to planning authorities and the Scottish Executive have raised the issue of misleading visuals. There then followed the findings and recommendations of The University of Newcastle Report, an attempt at a solution by Perth and Kinross Council, and nearly five years of detailed correspondence between the Highland Council and Architech on the issue.

Finally, we have what we consider to be an unsatisfactory new Guidance from SNH produced at considerable public expense in which such a simple issue is made to appear ever more technical, complex and inaccessible to the public.

Somewhere, the clear purpose of the statutory framework for Environmental Impact Assessment has been lost, namely, that the defined procedures are intended to ensure that the predicted effects are properly understood by the public and the relevant competent authority before it makes its decision. The current visuals are not properly understood by the public, and nor, we would respectfully suggest, by the competent authorities.

The public are still demanding simple single frame photomontages which give a fair representation of what they will see. Meanwhile, it is our judgement that the windfarm developers along with a small group of landscape consultants who are employed directly by the industry continue to dictate their own Guidance which misrepresents what we actually see and confuses the public throughout Scotland.

An urgent and speedy independent investigation into the whole issue is therefore necessary.

It is vitally important for the future of Scotland.

\*\*\*\*\*

Alan Macdonald *Dip Arch RIBA*  
*On behalf of Architech Animation Studios (UK) Ltd.*  
*E-mail: info@thevisualissue.com*

*29th April 2007*

## **REFERENCES**

University of Newcastle (2002) Visual Assessment of Windfarms Best Practice. Scottish Natural Heritage Commissioned Report (unpublished) F01AA303A

Guidelines for Landscape and Visual Impact (2nd Edition/2002) - The Landscape Institute and Institute of Environment Management & Assessment

Guidelines on the Environmental Impacts of Windfarms and Small Scale Hydroelectric Schemes: Scottish Natural Heritage, 2001

Draft Wind Energy Policy Guidelines for Perth & Kinross Council (April 2004)

Applied Photographic Optics (3rd Edition/2002) - Sidney F. Ray

Visual Representation of Windfarms: Good Practice Guidance - Final Version Published by Scottish Natural Heritage - February 2007

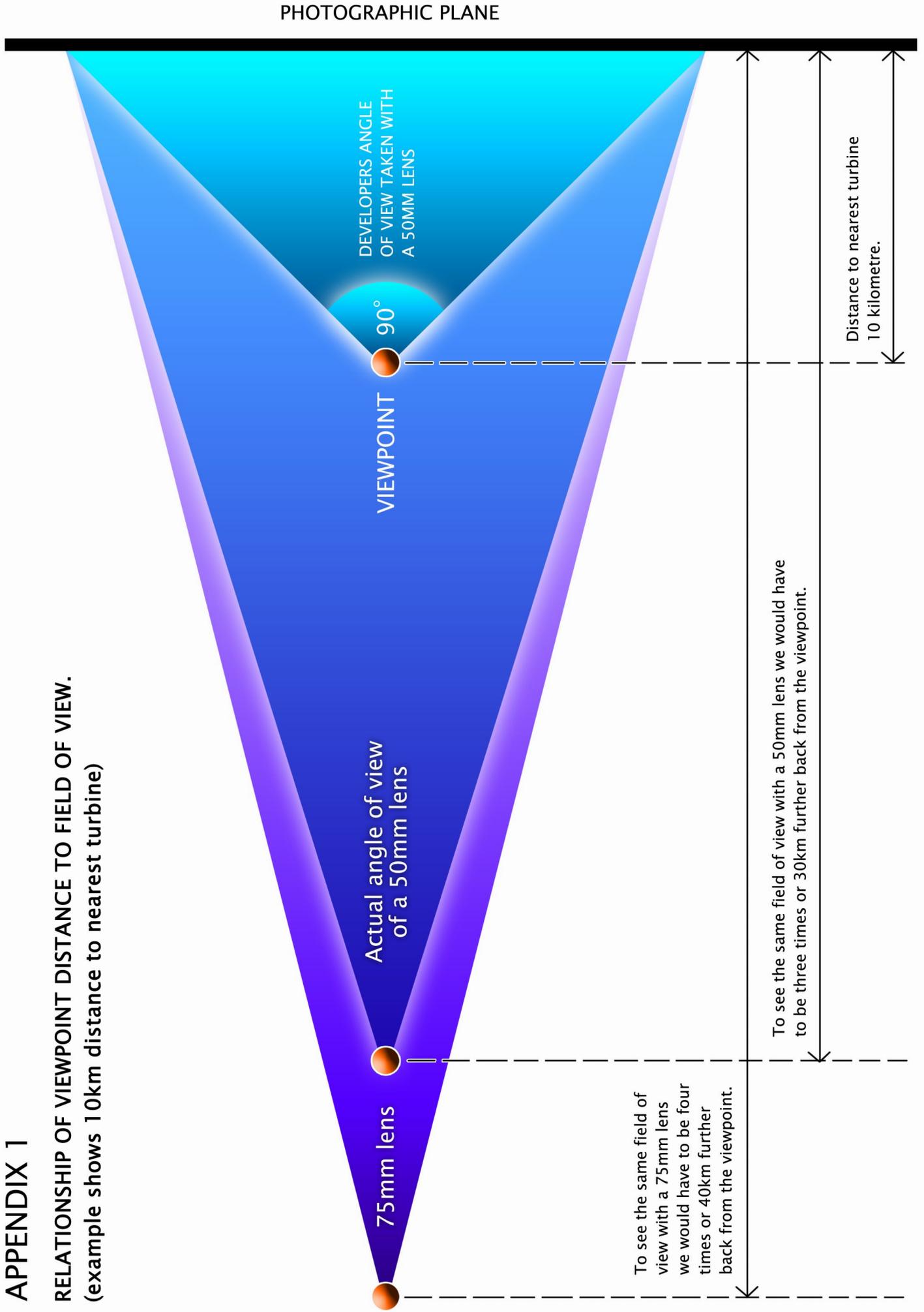
## **APPENDICES**

Appendix 1: Diagram showing the relative fields of view of different lenses.

Appendix 2: Front cover of the University of Newcastle (2002) Visual Assessment of Windfarms Best Practice (unpublished).

# APPENDIX 1

RELATIONSHIP OF VIEWPOINT DISTANCE TO FIELD OF VIEW.  
(example shows 10km distance to nearest turbine)



## APPENDIX 2

### **Visual Assessment of Windfarms: Best Practice**

Report No. F01AA303A

For further information on this report please contact:

Nigel Buchan  
Scottish Natural Heritage  
2 Anderson Place, Edinburgh EH6 5NP

This report should be quoted as:

University of Newcastle (2002) Visual Assessment of Windfarms Best Practice. *Scottish Natural Heritage Commissioned Report F01AA303A.*

This report or any part of it should not be reproduced without the permission of Scottish Natural Heritage which will not be unreasonably withheld. The views expressed by the author(s) of this report should not be taken as the views and policies of Scottish Natural Heritage.  
© Scottish Natural Heritage 2002.