

# VISUAL PERCEPTION VERSUS PHOTOMONTAGE

## NON-TECHNICAL SUMMARY

### *Introduction*

The development of off shore wind farms in the territorial waters around the United Kingdom, commenced with the announcement of Round 1 Projects in December 2000.

Each of the Round 1 Projects was limited to 30 turbines and 17 proposals were put forward for consideration at various locations around the coast of the UK.

The Secretary of State announced Round 2 of the United Kingdom's offshore wind farm programme at the end of 2003. Early indications suggest that the Round 2 Projects are likely to be more extensive than those of Round 1, possibly involving hundreds of turbines.

The future development of off shore wind farms around the coastal waters of the United Kingdom, represents a challenging assignment for those involved in assessing and predicting the likely visual impact of such developments.



Photograph courtesy of National Wind Power Ltd

### *The Study*

The use of photomontages is a recognised tool used in helping to predict the likely visual impact of any proposed development. However, the visual impact assessment of off shore wind farms, will have to consider several other issues and factors compared to land based wind farms and other developments. The standard practice of preparing a photomontage, may not be appropriate for offshore wind farms and may need reviewing.

This study examines and compares photomontages to visual perception, using the recently constructed North Hoyle Wind Farm off the North Wales coast as a case study. The purpose of the study is to inform and advise on the preparation of future photomontages for offshore wind farms and to examine how effective they are compared to observations made in the field.

### *Distance, Size and Scale*

Key factors will be the distance of the proposed wind farm off shore and the locations from which it will be visible. There will also be technical and operational considerations that will limit the location of the proposed wind farm to within a certain distance offshore.

Other considerations such as wind patterns, the depth of the sea, shipping lanes, wildlife and marine ecology, are other factors that may influence the locations of proposed off shore wind farm developments.



Photograph courtesy of National Wind Power Ltd

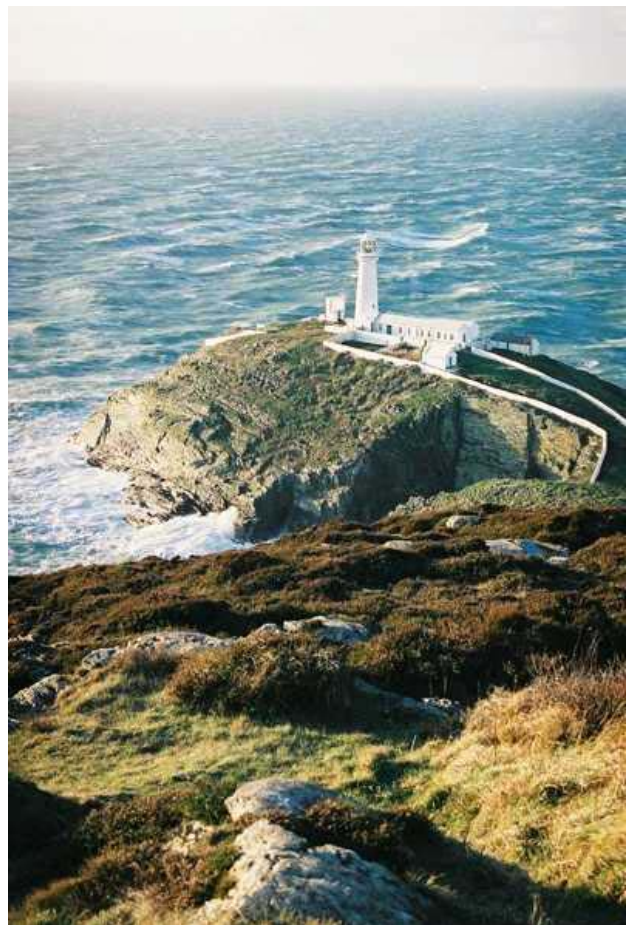
Wind farm technology is constantly evolving with the increasing size of wind turbines and the scale of the proposed wind farms, possibly involving hundreds of turbines, becoming more extensive and covering large areas of sea.

Many turbines currently used in the off shore wind farm industry are over 100 metres high, with the blades of the turbines reaching over 40 metres in length and future turbines are likely to be even larger. Off shore turbines can be up to double the size of some of the land based turbines that have been built in the last few years.

As technology develops it is likely that the location of the wind farms will be less restricted by the proximity of the coastline and the depth of the sea. There are now proposals to locate wind farms over 20 kilometres off shore at the limit of the United Kingdom's territorial waters.

Depending on the location of the wind farms, there may be no nearby landmarks against which size of the turbines can be pictured or compared to. The distance of the wind turbines away from the coast may also be difficult to visualise. It is important that the scale of the turbines is understood as this affects our judgement of distance.

A simple exercise that may help people visualise the scale of a wind turbine, is to compare the size of the turbine to a well-known local landmark. This will also help in being able to visualise the distance of the development out at sea.



Photograph courtesy of Symonds Group Ltd

## *Photomontages*

Photomontages are a useful tool in helping visualise a proposed development such as an offshore wind farm. The photomontage is prepared by taking photographs from a well-known viewpoint from where it is considered that the off shore wind farm will be visible. More than one viewpoint is usually chosen in order to represent typical views of the development from that particular area of coastline.

A photographic panorama should be taken from each of the viewpoints chosen. The photographs should be taken at various times of the day in different climatic conditions and if possible during different times of the year. In order to assess the frequency and range of weather conditions, the local meteorological records or weather station should be consulted.



Photomontage courtesy of National Wind Power Ltd

The length of the panorama will vary depending on the likely extent of the proposed development. As a general guide, the human eye only focuses on a limited field of vision (40 degrees) and beyond this field of vision only detects movement in what is known as the peripheral vision.

Current guidance and best practice advocates the use of a Single Lens Reflex (SLR) camera using a 35mm film and a 50mm focal length lens that is representative what the human eye sees. The study has found that a more accurate impression of the perceived view is recorded using a 70 or 80mm focal length lens. The photographs are then stitched together using a software package to form the panorama.

Using computer technology, the height and location of the proposed turbines are generated from the location of a known viewpoint and wire framed images of the turbines superimposed onto the panorama. Again using computer technology, the image is manipulated to depict the wind turbines in the appropriate colour, usually white.

The photomontages are usually presented to conveniently fit within a standard report format. The study has found that printing the image of the panorama to a height of approximately 20 centimetres, more accurately represents what is actually perceived by the human eye.



Photomontage courtesy of National Wind Power Ltd

### ***The Limitations of Photomontages***

The photomontages may appear to be very accurate and what appears to be a very realistic view of the proposed turbines. There are however several factors that need to be considered when viewing the photomontage. Firstly, the appearance of the wind turbines when viewed in reality, are likely to appear larger than in the photomontage. This is basically because the human eye records more detail in the field than is perceived when viewing a photograph. The turbines may appear to be larger when a familiar object is seen within the same view, as the human eye will have a known object to compare the turbines to.



Photograph courtesy of Symonds Group Ltd

The movement of the wind turbines will not be recorded by the photomontage (unless techniques such as video montages are used) and is likely to be a highly visible element of the wind turbines. The use of video montage is not widely used and costly but may become more available in the future. The movement of the turbines when seen in the field will also be detected by the peripheral vision of the human eye and therefore be far more noticeable in the field compared to a static photomontage. It is likely that the wind turbines will be in motion for approximately 90% of the time, although the blades of the turbines will not always operate simultaneously and sometimes, if the wind speed is too slow or too fast, the rotor blades will not be moving at all.

### ***Atmospheric Conditions***

The atmospheric conditions of the local climate and the orientation of the wind turbines will affect their visibility. These conditions are likely to be extremely variable and cannot be accurately predicted in photomontages.

Depending on the time of the year, the path and aspect of the sun may mean that the wind turbines are silhouetted against the sky or appear white against a dark cloudy sky. Depending on the height of the viewpoint, the wind turbines may appear on the skyline or horizon line, or appear below the horizon when viewed from a high point along the coastline.



Photograph courtesy of National Wind Power Ltd

### ***Summary***

The development of off shore wind farms around the United Kingdoms coastal waters is an exciting advancement for the off shore wind energy industry. It also provides a challenging subject for those involved in the preparation of Visual Impact Assessments and related seascape projects.

The study has revealed that photomontages have their limitations and that current best practice guidelines for the preparation of the visualisations is misleading. Recommendations are proposed for some simple amendments to the current guidelines. Nevertheless, constructed turbines are likely to be far larger and more visible to the naked eye than they appear in any photomontages and it should be acknowledged that the visual perception of the human eye, is far more acute than a static photomontage or photographic image.