



**SCHOOL OF ECONOMICS, BUSINESS ADMINISTRATION AND
LEGAL STUDIES**

MSc in Bioeconomy Law, Regulation and Management

Coursework

**"The anthropogenic impact on the environment of the wind farm on
the Cullerin Range, in Australia"**

Student: Maria Georgakopoulou
Subject: Anthropogenic Degradation of the Environment
Instructor: Dr. Savvas Genitsaris
Academic year: 2017-2018

The anthropogenic impact on the environment: The wind farm on the Cullerin Range, in Australia

Human Activity

Wind energy is one of the top environmentally friendly technologies that generates electricity with low risk operations. The present case study refers to the development of a 30 MW Wind Farm on the Cullerin Range, on the Southern Tablelands of New South Wales in Australia and evaluates its environmental impact.

As for the technical specifications, each wind turbine consists of 3 blades with a radius of 46m long on a tower 80m high, total of 16 turbines.

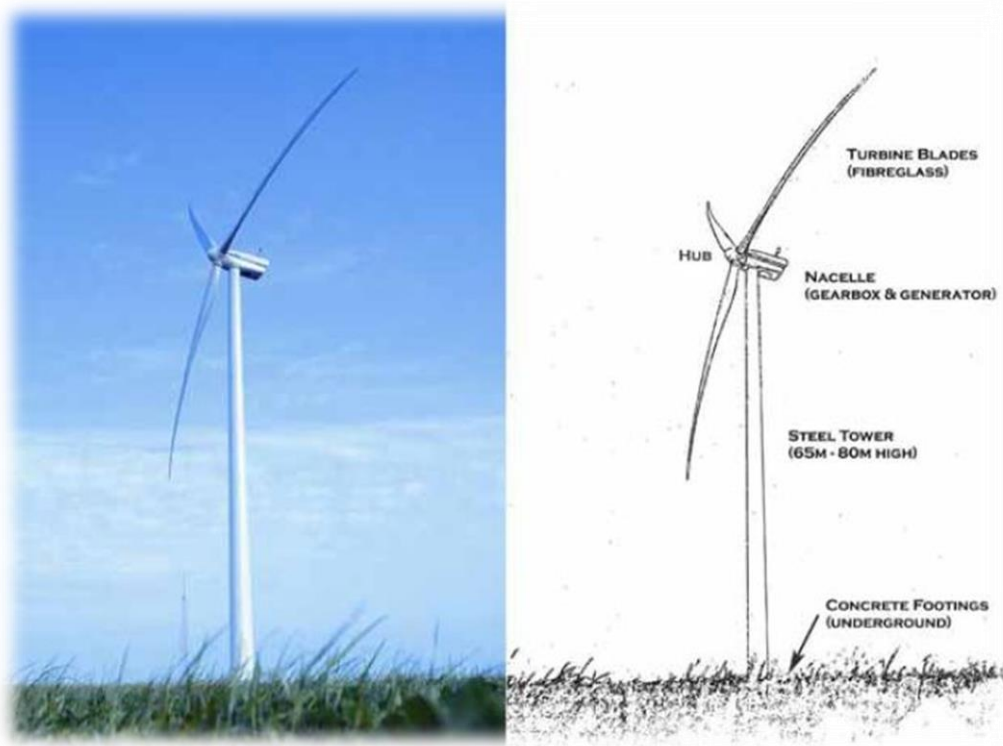


Figure 1.1 Environmental Assessment, Proposed Development of a 30MW Wind Farm on the Cullerin Range, Southern Tablelands, New South Wales, NGH environmental Sydney

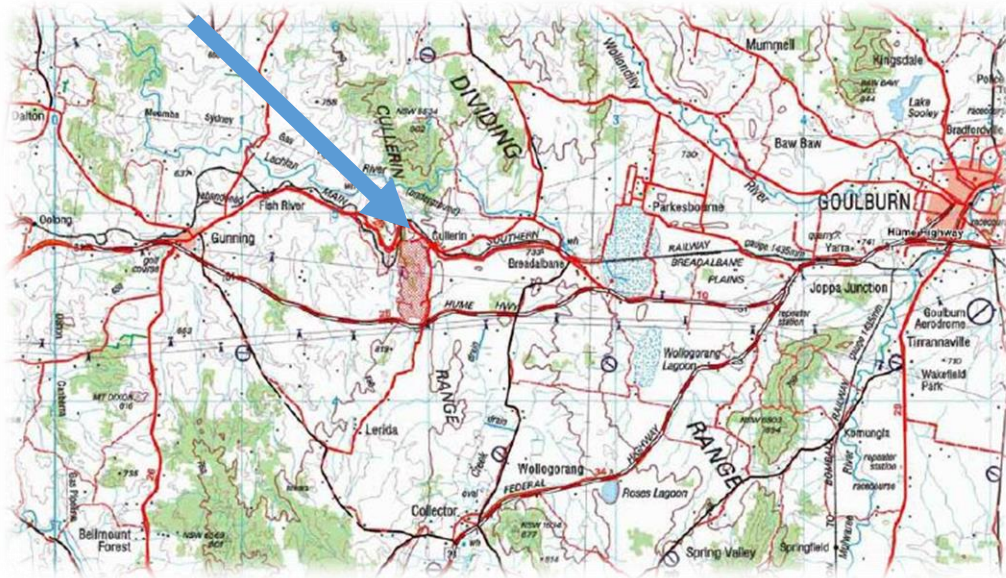


Figure 1.2 Map of the wind farm location
 Environmental Assessment, Proposed Development of a 30MW Wind Farm on the Cullerin Range,
 Southern Tablelands, New South Wales, NGH environmental Sydney

How does a wind farm affect the Environment?

In general, several surveys demonstrated that the main consequences of the wind farms to the ecosystem have to do with the effects to the local fauna, flora and the local climate due to the added turbulence that mixes the air locally and creates a warm and dry effect near the ground. This phenomenon extends in kilometres, affecting irrigation and agriculture, while certain studies have shown that in the afternoon hours the atmosphere is less turbulent and the temperature of the area is rising by two - three degrees Celsius for several hours. The rotating propellers redirect the strong winds to the surface of the soil, causing the evaporation of a percentage of the soil moisture.

The microclimate can be affected even within a radius of one kilometre from the point where the wind turbines are installed. This means that there is an imminent impact on the environment by the creation of «dry winters». The operation of giant wind turbines in high Beaufort conditions does not allow the creation of snow in the mountain peaks. The result is to significantly reduce the aquifer and affect the crops, when, at the same time, precious aquifers are lost not by natural causes, but by artificial means. In addition, the area where the wind farms were constructed could not easily be restored and used for other activities in case the park is removed, because the area is altered to such extent that a large part of the installation (for example extensive concrete bases and asphalted roads) can only remain unused in the region, causing further risks and downgrades.

As far as fauna is concerned, the biggest problem is encountered by the death of passing birds or bats that are killed or injured due to propeller movement. A general study of an average wind park indicates that wind farms are responsible for about one bird death every 2 gigawatt hours. In Denmark for instance, where wind farms generate 9% of

electricity, wind turbines kill about 30.000 birds a year. In the US, the Ministry of the Environment, in collaboration with the wildlife protection agencies, recorded in 2009 that wind turbines are killing 440.000 birds per year.

In what way the Environment was degraded in Cullerin Range?

An important environmental impact of the wind farm is that its elevated position of the site may increase the percentage of lightning strikes. Furthermore, the steep topography and absence of built areas or natural fire breaks, such as large waterbodies, may assist the rate of spread of wildfires.

As flora is concerned, some areas in Cullerin Range where the wind farm is installed, which are more exposed, tend to have a variation of brittle gum - *Eucalyptus mannifera* (near Tussock Grass Forest), yellow box and Blakely's red gum. The lower hills near this establishment have less vulnerable parts of woodland which are in very good status to be regarded as being examples of the White Box, Yellow Box, and Blakely's Red Gum Woodland Endangered Ecological Community (EEC) under the Conservation Act of threatened Species of 1995. The only area of the Cullerin wind farm that was officially part of the EEC was the steep slope, northern of the site, which still includes a crucial variety of native grasses and forbs, thus it was somehow degraded by grazing and weed invasion. This area was not of high conservation significance.

Regarding fauna, the listed Commonwealth species, including all migratory species, were also taken into consideration. Four broad habitat types were identified, providing various habitat resources for fauna onsite; woodland slopes and ridges, grassland and wetlands. Mammals, birds, reptiles and amphibians were assessed during the environmental evaluation. One threatened species was documented during field works, the Large-footed Myotis, *Myotis adversus*. Additionally, 14 species were found to have a rating of moderate potential impact and the remaining, were listed as having low possibility to be affected. Species categorized with a rating of high or moderate potential impact include the following: the Superb Parrot (*Polytelis swainsonii*), Green and Golden Bell Frog (*Litoria aurea*), Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), Eastern Bent-wing Bat (*Miniopterus schreibersii*), Eastern Long-eared bat (*Nyctophilus bifax*), Long-footed Myotis, Square-tailed Kite (*Lophoictinia isura*), Speckled Warbler (*Pyrrholaemus sagittatus*), Powerful Owl (*Ninox strenua*), Grass Owl (*Tyto longimembris*), Gang-gang Cockatoo (*Callocephalon fimbriatum*), Swift Parrot (*Lathamus discolor*), Diamond Fire tail (*Stagonopleura guttata*), Regent Honeyeater (*Anthochaera phrygia*) and Brown Tree creeper (*Climacteris picumnus*).

Assessments of environmental impact took place only for species of high and moderate levels of risk. Important effects are not anticipated on these species as a consequence of the development of the wind energy - electricity generators. For the species of Green and Golden Bell Frog, this relates to careful positioning of infrastructure and access routes with minor consequences. However, for micro chiropteran bats, birds of prey and woodland birds, considered risk of population level impacts exists through ongoing collisions with turbines, as it was already mentioned previously. The surrounding habitat and local records, as well as consideration of mortalities at existing wind farms,

demonstrate that the expected levels of collisions would not result in a population level impact. However, given the lack of long-term data available, a level of uncertainty remains. The private company that is responsible for the construction and the maintenance was committed to an adaptive management programme to monitor impacts on the aforementioned species and take proper actions and precautions to reduce unexpected impacts and results.

The actions that were taken to minimize the human activity that caused the environmental problems and the environmental degradation itself.

An Assessment of Significance was carried out to characterize the potential impact on Yellow Box, Blakely's Red Gum Woodland. This assessment demonstrated that unacceptable impact can be avoided through careful positioning of installation and access routes and the appliance of standard weed and sediment erosion controls.

In order to reduce the impacts of the construction phase on vegetation onsite to an eco-friendly level, recommendations have focused on locating infrastructure, including tracks, in non-sensitive areas. This will result in protecting two areas of moderate conservation significance and implementing appropriate weed and sediment erosion controls and rehabilitation of disturbed areas, practicable after right after installment.

In a recent survey, the majority (90%) of respondents indicated that building pollution-free wind farms for electricity is more significant than avoiding building wind farms in rural Australia (5%), even though they did not want the landscape to be "mutated" and alternated by the enormous wind turbines.

Nevertheless, the wind farm is expected to reduce greenhouse gas emissions by 85,000 to 95,000 tons of carbon dioxide per year, or have a cumulative effect of 2.55 to 2.85 million tons of carbon dioxide over the life of the establishment. This is the equivalent reduction in greenhouse gas emissions of subtracting 15,000 to 20,000 typical cars off our streets for 25-30 years.

It is clear that wind energy installations may have a significant impact to the flora and fauna of the region, as well as the rural landscape and the environment in whole. More actions need to be done towards that direction, so that the wind farms will be more cost-antagonistic and more efficient to the carbon dioxide reduction global efforts. The society is mature enough and centralised measures, not only in governmental level but also in transnational level, through specific legislation and international treaties are taken. All these, aim to reduce global warming emissions and ensure that there will be sufficient resources, in order to resist the effects of climate change by applying new technologies and using renewable sources of energy.

References

- NGH environmental Sydney (2006) *Environmental Assessment, Proposed Development of a 30MW Wind Farm on the Cullerin Range, Southern Tablelands, New South Wales, Australia.*
- <http://www.iwea.com/environmentalimpacts>
- <https://www.cbd.int/programmes/cross-cutting/impact/record.aspx?id=30683>
- <http://www.greenpeace.org/greece/el/>
- <https://windeurope.org/about-us/new-identity/>
- <http://www.cres.gr/cres/index.html>