



# Wind Farms & Heritage Policy (Draft)

Prepared by the NSW Heritage Office

September 2003

Please return comment to the Heritage Office by:  
17 October 2003

## Invitation for Public Comment

On Wednesday 17<sup>th</sup> September 2003 the Heritage Council of NSW released the draft *Wind Farm and Heritage Policy* for public comment. The policy aims to guide the choice of location and management of wind farm developments at or near heritage items, including cultural landscapes.

A package of documents has been developed with information on the draft policy. The package includes:

- The draft wind farm and heritage policy
- A summary document of the proposed policy
- A explanation for the importance of heritage, particularly cultural landscapes
- An explanation of the importance of wind farms in renewable energy development

Each document is available from the Heritage Office website: [www.heritage.nsw.gov.au](http://www.heritage.nsw.gov.au). Copies of this package will also be made available at the NSW Heritage Office, 3 Marist Place Parramatta NSW 2150.

## Public Comment

You are invited to make a submissions on the draft *Wind Farm and Heritage Policy*. Submission close on Friday, 17 October 2003.

Following this consultation process and consideration of the issues raised, the Heritage Council will consider the findings and a revised draft policy in December 2003.

Please note that for the purposes of the *NSW Privacy and Personal Information Protection Act*, any submissions on this plan, including your personal details, will be a matter of public record and will be stored in the Heritage Office records system.

If you do not want to have your personal details disclosed to members of the public once the plan has been adopted, you can prevent this. Just indicate in your submission that you wish your personal details to remain confidential to the Heritage Office and not available for public access.

## For further information contact:

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**To make a submission:**

| <b>By Post</b>   | <b>By email</b>  | <b>By phone:</b>                 |
|--|--|----------------------------------|
| Wind Farm and Heritage Policy (Draft)<br>NSW Heritage Office<br>Locked Bag 5020<br>Parramatta NSW 2124 | Subject: Wind Farm and Heritage Policy (Draft)<br><a href="mailto:Victoria.coleman@heritage.nsw.gov.au">Victoria.coleman@heritage.nsw.gov.au</a> | Victoria Coleman<br>02 9873 8595 |

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## FOREWORD

This paper proposes a policy concerning heritage and wind turbines for NSW.

To improve environmental sustainability the government and communities are seeking new renewable energy sources.

The Heritage Council and Heritage Office support the development of sustainable energy production facilities that meet legitimate community needs, and which support and contribute to the cultural and environmental heritage of the people in NSW.

Wind turbine farms are proving to be a popular renewable energy source. However, if they are inappropriately planned and developed, they have the potential to adversely affect heritage items including cultural landscapes.

This proposed policy aims to minimise or eliminate the potential impacts of wind farms on heritage items, by acting as a tool to assist the Heritage Office, local government, planning and developers in their decision-making processes.

### Background

Wind farms developments are growing at an rapid rate in Australia. While international growth sits at 35%; in Australia wind power has increased by 95% over the last five years (SEDA 2003).

Due to this growth many local government areas are now experiencing interest from developers in constructing wind farms. This interest has raised concern about the potential impacts of wind farms on cultural landscapes, particularly in the form of visual impacts.

At its 2<sup>nd</sup> April Heritage Council Meeting, a need for a Heritage Council report on wind farm developments and heritage places was expressed. The Heritage Office was asked to prepare a report on wind farms.

This draft policy document is as an interim document while the broader sustainability and heritage document is being developed. It is anticipated that renewable energy, including wind turbines, will form part of the heritage and sustainability policy.

Heritage Council Chair Michael Collins has also reported that the issue of Wind Farms was raised at the National Cultural Heritage Forum. At the forum, it was recommended that the government identify landscapes of cultural significance prior to finalising the wind farm policy. The need, not for a reduction in the existing renewable energy target, but for improved planning processes was also stressed. Minister Kemp recognised this as an important issue, and has agreed to contribute a limited amount of money in partnership with State agencies to facilitate a study on this issue. This issue was also discussed by the National Chairs and Heritage Officials (see over page). At the National Cultural Heritage Forum it was resolved that:

A national strategy will be developed in partnership between Commonwealth and State governments through the National Chairs and Heritage Officials and Ministerial Council.

The Heritage Office has consulted with the Sustainable Energy Development Authority in developing this draft policy, to gain an understanding of wind farm development and state government objectives for renewable energy in NSW.

This draft policy was presented to the Heritage Council of NSW on 6<sup>th</sup> August 2003. It was resolved at this meeting that:

1. **That the Heritage Council endorses the intent of the draft Wind Farm and Heritage policy document and requests the Heritage Office to further develop the policy taking into account the comments of the Heritage Council, the results of the forthcoming Cultural Landscapes Charette and the National approach to this matter via the Heritage Chairs and Officials forum.**
2. **Request the HO to engage further with SEDA to ensure the inclusion of heritage, natural and cultural landscape considerations in its renewable energy guidelines and publications.**

At the National Chairs and Officials meeting, members:

- (i) **Notes the written report and the additional verbal report by the Chair.**
- (ii) **Notes that in particular the issue of Windfarms has been raised at both the NCHF and the EPHC Standing Committee.**
- (iii) **Notes the Commonwealth's decision to fund the preparation of guidelines on the siting of Windfarms and that the National Heritage Chairs and Officials will be supported on the project.**
- (iv) **Resolved to advise the EPHC Council that the National Heritage Chairs & Officials regards the issue of Windfarms and their impact on the cultural landscape as a significant issue requiring a coordinated national approach to reach resolution.**

The Cultural Landscapes Charette was very successful and a report of its outcomes is currently being drafted. This will be available from the Heritage Office website by the end of September.

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**1. The Purpose of the Wind Farms and Heritage Policy**

- 1.1. This policy document outlines the Heritage Council's objectives, policy and directives for wind farm development and heritage.
- 1.2. The document will provide strategic guidance in decision making about wind farms to Heritage Office staff and promote a consistent approach within the Heritage Office. The Heritage Office anticipates that this document will also assist planning authorities, local government and developers.
- 1.3. This aim of the Wind Farm and Heritage policy is to:
  - Give applicants more certainty as to works that will gain approval by clearly stating the Heritage Council's policy for wind farms developments and heritage items including landscapes;
  - Ensure that the Heritage Council, Heritage Office, heritage advisors and local governments provide consistent advice on proposals for wind farm developments;
  - Provide planning agencies and local governments with a tool for proactive planning for renewable energy developments; and
  - Encourage a high standard of conservation management for heritage items and cultural landscapes in NSW.
- 1.4. This policy supports the key principles and objectives of sustainable development, including intergenerational equity, transparency and accountability, and the conservation of cultural and environmental resources.
- 1.5. This policy will be reviewed regularly and updated to ensure that it responds to developments in renewable energy and / or heritage management. All new editions will be available from the NSW Heritage Office website.
- 1.6. Renewable energy is an important consideration when understanding sustainable development. Renewable energy will form an important part of the heritage and sustainability policy's agenda.
- 1.7. While the Heritage Council supports renewable energy development, it recognises that if inappropriately planned, renewable energy developments can adversely impact upon heritage items and cultural landscapes.

The principles that underlie heritage conservation in Australia are expressed in the *Australian ICOMOS Charter for Places of Cultural Significance – The Burra Charter* (1999). This Heritage Council policy is underpinned by the principles explained in that Charter and utilises many of the Articles from that Charter directly.

**Heritage significance**

*Of aesthetic, historic, scientific, cultural, social, archaeological, natural or aesthetic value for past, present or future generations.*

**State Heritage Register**

*A register of state significance heritage items including places, buildings, work, relics, movable objects, and precincts that are protected under the Heritage Act 1977.*

**State heritage significance**

*In relation to place, building, work, relic, moveable object or precinct, means significance to the State in relation to the historical, scientific, cultural, social, archaeological, architectural, natural or scientific value of the item.*

**Heritage Item**

*A place, building, work, relic, moveable object or precinct of heritage significance.*

**Cultural Landscapes**

*Those areas of the landscape that have been modified by human activity. They include rural lands such as farms, villages and mining sites, as well as country towns and landscapes of significance to Aboriginal people.*

- 1.8. Wind farms can adversely impact on cultural landscapes more than any other form of heritage. This is partly due to the lack of formal identification tools developed in the past, leading to low levels of recognition and protection given to valuable cultural landscapes. This protection has become a key objective of the state government.
- 1.9. Current statutory obligations towards heritage under the *Heritage Act 1977* would exclude the destruction of a heritage item listed on the State Heritage Register.
- 1.10. The Heritage Council encourages strategic approaches to renewable energy planning, development and management to eliminate or minimise these impacts.
- 1.11. Environmental protection zoning is one management approach that has been utilised by government in managing cultural landscapes.
- 1.12. Wind farms developments have trebled in the last three years in NSW. This document is being developed to ensure that local governments, planners, developers and the Heritage Council can strategically plan for these developments, without destroying heritage assets.

With over 40,000 years of Aboriginal occupation, the precautionary principle must be adopted to suggest that all landscapes must be considered cultural landscapes.

Many cultural landscapes have not yet been formally identified on the SHR or in LEP's.

The Heritage Office is currently developing a policy for the identification and management of cultural landscapes.

**Wind farm**

*land used to generate electricity by wind force. It includes one or more turbines, and any building, or other structures or things used in or in connection with the generation of electricity by wind force. It does not include turbines principally used to supply electricity for domestic or rural use of the land or anemometers.*

**2. Key Considerations Regarding Wind Farms and Heritage**

- 2.1. An impact is any effect on heritage items, including cultural landscapes, which would not have occurred in the absence of the development. An adverse impact is one that leads to the loss of heritage value.
- 2.2. Wind farms can have negative impacts on heritage items, including cultural landscapes, not only because of the wind turbines but also because of the ancillary infrastructure requirements, such as grid connections and access tracks.
- 2.3. Identifying the significance of an impact requires consideration of not only the magnitude of the impact and its likelihood of occurring but also the value and importance placed on the heritage item.
- 2.4. Impacts on heritage items, including cultural landscapes, are best avoided by locating the wind farm away from an area of high heritage significance. However, wind turbine technology, industry standards and management plans have also evolved to a point where many impacts can be minimised or eliminated (SEDA 2001).

**Curtilage**

*The geographical area that provides the physical context for an item, and which contributes to its heritage significance. Land title boundaries and heritage curtilages do not necessarily coincide.*

**Materially Affect**

*The changes proposed to a heritage item that will have an affect on the heritage significance of the item. This is not restricted to changes to the built fabric.*



- 2.5. Increasingly landscapes of heritage value are being lost through urban sprawl and industrial developments.
- 2.6. “A heritage item needs to be considered in the context of the history and historical geography of the area surrounding it. When identifying the heritage items of a given area, a purely visual approach is inadequate. It is important to understand the *underlying* historical influences which have shaped and continue to shape the area” (Heritage Office & DUAP 1996).
- 2.7. Wind farms have the potential to materially affect the heritage significance of a cultural landscape, thus the impact of a wind farm within the viewshed of a state significant cultural landscape should be considered.
- 2.8. Visual impact of a wind turbine can intrude on the significant elements of heritage item including cultural landscapes. This policy attempts to address these contentious issues.
- 2.9. Wind farms and associated infrastructure also have the potential to impact upon Aboriginal heritage. This cultural heritage is protected under the under Section 90 of the National Parks and Wildlife Act 1974 (NPWS Act) or pursuant to Section 91 and 91A of the Environmental Planning & Assessment Act 1979 (EP&A Act).
- 2.10. The cultural significance of a landscape to Aboriginal people should be examined as part of any consideration.
- 2.11. For Aboriginal people, the significance of individual features is derived from their inter-relatedness within the cultural landscape. This means that features cannot be assessed in isolation, and that any assessment must consider the feature and its associations in a holistic manner. This may require a range of assessment methods and will always require the involvement of the local Aboriginal community or communities.
- 2.12. Wind farms can adversely impact upon Aboriginal landscapes when appropriate assessments are not undertaken. The NSW NPWS are currently developing *Guidelines for Aboriginal Heritage Impact Assessment*. These guidelines should be consulted when a proposed wind farm could potential impact upon Aboriginal heritage.

The NSW National Parks and Wildlife are the statutory authority on Aboriginal heritage and must be consulted on these matters.

The term “materially affect” is used in s61 of the Heritage Act 1977 as the bar for determining whether an application for works to a heritage item need to be advertised. Therefore when, in the opinion of the determining body, the application materially affects the significance of the heritage item, it must be advertised.

**Viewshed**

A physiographic area composed of land, water, biotic, and cultural elements which may be viewed and mapped from one or more viewpoints and which has inherent scenic qualities and/or aesthetic values as determined by those who view it.

**Aboriginal heritage**

includes, but is not limited to, landscapes, sites and areas that are particularly important to Aboriginal people as part of their customary law, developing traditions, history and current practices. (AHC 2002)

**Aboriginal heritage** is dynamic. It includes tangible and intangible expressions of culture that link generations of Aboriginal people over time. Aboriginal people express their cultural heritage through 'the person', their relationships with country, people, beliefs, knowledge, law, language, symbols, ways of living, sea, land and objects all of which arise from Aboriginal spirituality. (AHC 2002)

### 3. Managing the Impacts of Wind Farms on Heritage

- 3.1. Heritage includes our landscapes, buildings, structures, relics, places and other works on land and under water. Our heritage is a valuable cultural resource that is non-renewable and becoming increasingly scarce. Heritage gives identity to and inspires present and future generations.
- 3.2. Heritage items listed on the State Heritage Register under the *Heritage Act 1977* require the approval of the Heritage Council before the development of the item, place or area.
- 3.3. The Act also requires that an excavation permit be obtained before any relic can be disturbed, whether or not it is listed on the State Heritage Register.
- 3.4. Wind farm proposals impacting on heritage items, including cultural landscapes, of state heritage significance (i.e. those not formally recognised by listing on the State Heritage Register) should be referred to the Heritage Council for comment.

#### **Excavation permit**

A permit issued by the Heritage Council of New South Wales under section 60 or section 140 of the Heritage Act 1977 to disturb or excavate a relic.

#### **Relic**

The Heritage Act 1977 defines relic as '*...any deposit, object or material evidence relating to non-Aboriginal settlement which is more than fifty years old.*'

The National Parks and Wildlife Act 1974 defines a relic as: '*...any deposit, object or material evidence (not being a handicraft made for sale) relating to indigenous and non-European habitation of the area that comprises New South Wales, being habitation both prior to and concurrent with the occupation of that area by persons of European extraction, and includes Aboriginal remains.*'

#### 4. Scope of Policy

- 4.1. Wind farms should not be located within the curtilage of an item listed on the State Heritage Register, or place identified as state significant on a LEP, or impact upon significant views to and from the heritage item (including cultural landscapes);
- 4.2. The impacts of a wind farm on an identified or potential culturally significant landscape of local significance must be carefully assessed prior to development approval to determine the appropriateness;
- 4.3. Development should be sited and carried out so that it is unlikely to inhibit or restrict current land use activities that contribute to the significance of any affected heritage item/s.
- 4.4. Development should be carried out in a way that minimises any adverse effects on adjoining land – particularly by way of impacts on heritage items, including landscapes, archaeological items and relics; and Aboriginal heritage.

#### **Statement of Heritage Impact**

*Analyses the impact of proposed works on the significance of a heritage item. It normally forms part of a Statement of Environmental Effect accompanying a development application.*

To obtain the guidelines for writing a Statements of Heritage Impacts visit *Publications* at [www.heritage.nsw.gov.au](http://www.heritage.nsw.gov.au)

#### 5. Assessment Mechanisms

- 5.1. Developments that may potentially “materially affect” the heritage significance of an item listed on the State Heritage Register, must submit a Statement of Heritage Impact to the relevant decision making authority.
- 5.2. A Statement of Heritage Impact must be submitted to the relevant consent authority for a proposal within, or within the view shed of, a culturally or environmentally sensitive landscape.
- 5.3. A Statement of Heritage Impact should include information regarding the turbines number, dimensions, materials and colour.
- 5.4. Wind turbines within a facility should be identical in style, size and colour.
- 5.5. A statement of alternatives should be presented, which identifies:
  - Impacts of comparable levels of energy production in the locality by other methods such as coal, hydro, solar, or a combination of such methods;

#### **Principals of Sustainable Development**

(Adapted from Environment Australia 1992)

- *integrating economic and environmental goals in policies and activities;*
- *ensuring that environmental (including*

- The social, economic and environmental costs and benefits of operating the proposed facility in other comparable localities within the LGA/region; and
- The opportunity cost of the development.
- Assessment and consideration of the principles of sustainable development.

*cultural) assets are properly valued;*

- *providing for equity within and between generations;*
- *dealing cautiously with risk and irreversibility ; and*
- *recognising the global dimension.*

These principles will be revised upon the release of the Heritage Council's *Heritage and Sustainability Policy*.

5.6. Reference should be made to:

- PlanningNSW EIA Guidelines;
- SEDA (2001) *The NSW Wind Energy Handbook*, Sustainable Energy Development Authority

## 6. General Guidance

- 6.1. Generally, a wind farm design should seek to ameliorate visual impacts.
- 6.2. The terms “scenic beauty” or “scenic amenity” should be avoided in applications or statements of heritage impact, and a recognised qualifiable or quantifiable value determined – i.e. cultural landscape, heritage item, ecological diversity, aesthetic significance etc.
- 6.3. Community consultation should form an integral component of the assessment and decision making processes.
- 6.4. Local Governments are encouraged to identify suitable zoning for wind farms, based on existing zoning objectives. This may form an amendment to the existing LEP, or may require the preparation of a new LEP.
- 6.5. Local government authorities and state agencies with s170 reporting requirements are strongly encouraged
  - to identify cultural landscapes under their care, control or management, and
  - to develop appropriate cultural landscape conservation management plans or approaches.
- 6.6. Impacts on neighbouring local government areas must be considered by the local councils concerned. Relevant state agencies should also be contacted.

## 7. Developing A More Detailed Local Approach

- 7.1. The NSW Heritage Office supports the development of Development Control Plans for local government areas identified as having suitable wind energy for wind farms.

The Heritage Council suggests local governments amend their LEP's in light of this available information, and develop revised zonings and development standards for wind farms, or for future planned or potential development of wind farms.

- 7.2. A wind energy map can be obtained from SEDA in GIS format.

The Heritage Office's is in the process of developing a GIS system, which will map heritage items and cultural landscapes throughout NSW. This will simplify the identification of heritage items within a local government area or region, as well as physical relationships between items, cultural landscapes and (proposed) energy production facilities.

## 8. Issues for consideration by other approval bodies

- 8.1. The Development Application, Statement of Environmental Effects or Environmental Impact Statement and plans should indicate:
- 8.2. ▪ Heritage items, archaeological items and, culturally and environmentally sensitive land on maps of the proposed development and its area;
- 8.3. ▪ The site plan or plans showing the positioning of the wind turbines and site boundaries, in relation to heritage items, archaeological items, and culturally and environmentally sensitive lands;
- 8.4. ▪ A description of the visual effects on cultural landscapes and heritage items, including photomontages, computer assisted photo simulations or other graphic representations of the appearance of the wind turbines and transmission lines, and associated temporary and permanent infrastructure;
- 8.5. ▪ View shed modelling via the use of a suitable GIS, with cultural landscape and heritage item overlays;
- 8.6. ▪ A construction environmental management plan, including the cultural environment, incorporating the proposed staging of the project, heavy vehicle movements, site access including service roads, transmission towers, underground wiring and all other works; and
- 8.7. ▪ All other relevant issues in *PlanningNSW EIA Guidelines* and the *NSW Wind Energy Handbook*.

## **9. Conclusions**

- 9.1. The Heritage Council recognises and supports the need for the development of sustainable renewable energy facilities in NSW. The Heritage Council also recognise the potential impact that these facilities can have on heritage items, including cultural landscapes.
- 9.2. The Wind Farm and Heritage policy is intended to assist the Heritage Council, local government, planners and developers in decisions about wind farms. These guidelines aim to minimise or eliminate the impacts of wind farms on heritage items, including cultural landscapes.

## Annexure A

The wind farms and heritage policy considers only the potential affect of wind farms on heritage (built, natural, moveable, Aboriginal, maritime and archaeological). Other factors also need consideration in any wind farm development, such as wind speed, grid connections, low flying training areas, radar interference, landowner and community interests – these matters are for others to advise.

The guidelines apply only to wind farms, and exclude small wind developments of a domestic or small business scale, typically single turbines under 10kW capacity.

The guidelines provide broad guidance on managing the interaction between likely interests in wind farm development, and valued heritage resources.

### **Renewably energy in NSW**

There has been increasing interest in wind farm and wind turbine developments within NSW, since the introduction of the Federal Government's Mandatory Renewable Energy Target in 2001. The *Renewable Energy (Electricity) Act 2000* requires the generation of 9,500 gigawatt hours of extra renewable electricity per year by 2010, enough power to meet the residential electricity needs of four million people (EPA 2000).

The need for renewable energy stems from many sources. Of most concern is the effect of carbon emissions within the atmosphere, and land degradation.

Australia has one of the highest per capita greenhouse gas emission rates for developed countries in the world, contributing 1-2% of the global greenhouse gas emissions (EPA 1997). This results from number of factors, including (EPA 2000):

- the low population density;
- the use of private motor vehicles;
- the reliance on coal for power generation;
- infrastructure development; and,
- land clearing.

NSW has the highest population and the greatest greenhouse gas emissions for any state or territory in Australia (EPA 2000).

“In 1995 NSW and the ACT's combined emissions of greenhouse gases (excluding the effects of land clearing) totalled 127.1 million tonnes (carbon dioxide equivalent), an increase of 0.2 million tonnes from 1990.” (EPA, 2000).

## Responding to the Greenhouse Effect

*How did we get to this point in time?*

|      |  |
|------|--|
| 1988 | The international Intergovernmental Panel on Climate Change established  |
| 1992 | United National Framework Convention on Climate Change   |
| 1997 | Kyoto Protocol to the United National Framework Convention on Climate Change ratified. Australia's obligation under the Protocol is to limit emission increases to 8% above 1990 emission levels by the 'first commitment period' (2008-12). |
| 1998 | National Greenhouse Strategy introduced by Federal Government<br><br>Australian Greenhouse Office established to coordinated different sectors as well as the states and territories in achieving these targets.                             |
| 1996 | NSW Government establishes the Sustainable Energy Development Authority to facilitate and encourage corporate development of sustainable energies.   |

The major source of greenhouse gas emissions in Australia is stationary energy (including energy and manufacturing industries), which accounted for 56.8% of national emissions (EPA 2000). The NSW Government have identified two broad stakeholders to reduce energy emissions – producers and consumers.

Tax breaks and funding from both the Federal and NSW Governments have made clean energy an attractive business. The Commonwealth Government aims to generate an additional 2% of Australia's electricity from renewable energy by 2010; subsequently it has allocated \$13.5 million for the cleaner production of energy (EPA 2000).

The NSW Government aims to increase its purchase of renewable energy for State agencies from 5% to 6%. In addition, SEDA has worked with power utilities; who now offer 'green' power to businesses and households to encourage increased development of renewable energy sources (EPA 2000). Between 1999 and 2000, 'green' power consumers nationally almost doubled (SEDA 2000). Surveys on consumers have consistently found a willingness to pay higher premiums for green energy. In 1995, 58% of domestic customers from Sydney, Melbourne and Brisbane were willing to pay, on average, an additional AUD\$5.20 per week for green energy (Green Power, in EPA 2000).

The *NSW Electricity Supply Act 1995* requires electricity retailers to develop strategies to reduce greenhouse gases (EPA 2000). Licence holders must develop plans for energy efficiency and demand management, as well as strategies for purchasing electricity from renewable sources (EPA 2000). The NSW Government set a policy target of reducing greenhouse gas emissions arising from the supply of electricity to NSW customers by 5% per capita by 2000-2001 (based on 1989-90 levels) (EPA 2000).

### Positive aspects of Wind Farms

Wind energy can provide NSW with solutions to energy sources, which will benefit many. Wind energy is important because it:



### *Environmental*

- assists in reducing greenhouse emissions;
- increases energy security and diversity;
- uses comparatively less resources in construction, earning back its energy in only three months of operation (coal and nuclear power stations, will only ever deliver a third of the total energy used in construction and fuel supply [Australian Wind Energy Association, 2003]);
- is the most competitive energy source, when compared to traditional methods of energy generation;
- has comparatively few adverse impacts, which are both temporary and reversible;

### *Community*

- provides employment and development in regional areas;
- offers opportunities in local industries for growth in employment, investment and skills;
- is consistent with widely held values of sustainability;
- is one of the most easily understood and trusted energy sources;
- can provide landowners with a secure long-term income stream, complementing other forms of income, such as farming;

### *Business - Manufacturing*

- provides employment and investment in manufacturing;
- is highly efficient within energy networks;
- has a comparatively low capital cost;
- has a relatively short construction phase;
- turbine maintenance is low and predictable;
- has predictable operating costs;
- is a modular development, with opportunity to add or replace turbines progressively;
- can be installed close to the location of demand, minimising or avoiding transmission losses;
- land purchase is not usually required, as wind farms usually co-exist with agricultural activities.

### **Negative Impacts of Wind Farms**

Wind Farms have generated a lot of debate internationally. Concern typically surrounds topics such as:

- |                              |                               |
|------------------------------|-------------------------------|
| ▪ noise                      | ▪ communications impacts      |
| ▪ impacts on flora and fauna | ▪ social and cultural impacts |
| ▪ visual impacts             | ▪ public safety               |
| ▪ aviation impacts           | ▪ lightening                  |

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