

## Shire of Moora

Local Planning Policy – Renewable Energy Facilities, Associated Transmission and Storage Infrastructure and Future Technologies

## FOR PUBLIC CONSULTATION

History:	Initiating Draft No. I
Statutory context	Shire of Moora Local Planning Scheme No 4 (LPS 4)
	Planning and Development Act 2005
	Planning and Development (Local Planning Schemes) Regulations
	2015 (Regulations)
	DPLH Position Statement: Renewable Energy Facilities (March 2020)

#### **Background**

This local planning policy has been developed within the framework of the Shire of Moora Local Planning Scheme No. 4, guided by the Planning and Development Act 2005 and the Planning and Development (Local Planning Schemes) Regulations 2015. It aims to provide clear guidelines for the establishment and operation of renewable energy facilities, associated transmission and storage infrastructure and future technologies within the Shire of Moora while adhering to existing legislative requirements.

Wind energy is a priority component of the strategies supported by both, the Federal and Western Australian State governments for the development of renewable energy in pursuit of net zero targets. In recognising the potential benefits of renewable energy facilities and associated infrastructure, the Shire of Moora acknowledges the need to strike a balance between safeguarding the interests and well-being of the community, preserving the region's productive agricultural estate and the development of renewable energy initiatives within the Shire.

#### **Purpose**

The purpose of this policy is to provide a framework for the assessment, approval, and regulation of renewable energy facilities, transmission and storage networks and future technologies to be constructed in the Shire of Moora. The policy seeks to ensure that any proposed renewable energy facilities, associated transmission and storage infrastructure and future technology projects are developed in a manner that minimises negative impacts on the community and environment, while maximising the benefits to the community and the environment.

The Shire of Moora seeks to develop long-term, effective, and cooperative partnerships with developers to ensure the best possible outcomes for each party.

## **Policy Basis**

The Policy has been developed in accordance with the Planning and Development (Local Planning Schemes) Regulations 2015 Deemed provisions Schedule 2 Part 2 Division 2 – Local Planning Policies. The Policy may be cited as Local Planning Policy No. 4 – Renewable Energy Facility, Associated Transmission and Storage Infrastructure and Future Technologies.

The Policy does not bind the local government in respect of any application for a development approval however, the local government is to have due regard to the provisions of this Policy and the related objectives the Policy is designed to achieve, before making its final determination.

## **Objectives**

The objectives of the Renewable Energy Facilities, Associated Transmission and Storage Infrastructure and Future Technologies Planning Policy are:

- To promote the responsible development of renewable energy facilities and associated transmission and storage infrastructure within the Shire of Moora.
- To maximise the advantages, benefits, and development of future technologies in the Shire of Moora.
- To protect the health, safety, and amenity of the community and the environment of the Shire of Moora.
- To provide clear guidelines for the assessment and approval of renewable energy facilities, and related infrastructure projects in the Shire of Moora.
- To facilitate community consultation and engagement throughout the development process.
- To establish mechanisms that ensure community benefits commensurate with the total value of the investment and revenue generating capacity of the project are entrenched in project's overarching principles, frameworks, and operative mechanisms.
- To address and minimise the project's impacts, including environmental, visual, landscape, noise, dust, social, community infrastructure and other relevant factors on the community and environment.
- To set out minimum standards and requirements for the development of renewable energy generation projects and their associated influences and impacts on the community and environment.
- To preserve the region's productive agricultural estate.

## **Policy Provisions**

## General Requirements

In accordance with the Shire of Moora Local Planning Scheme No. 4 - "Renewable Energy Facilities, Associated Transmission and Storage Infrastructure and Future Technologies" are classified in accordance with Clause 3.2.4 as a *Use not Listed* and in accordance with Clause 3(2)(a) of the *Deemed Provisions (Schedule 2 Local Planning Regulations).* 

The Department of Planning, Lands and Heritage *Position Statement 2020* defines a "Renewable Energy Facility" as a:

Premises used to generate energy from a renewable energy source and includes any buildings or other structure used in, or relating to, the generation of energy by a renewable source. It

#### does not include

# renewable energy electricity generation where the energy produced principally supplies a domestic and/or business premises and any on-selling to the grid is secondary.

All renewable energy facilities, utility installations, transmission networks and future technology installations require Planning Approval. In addition to the completed application form and relevant fee, applicants must submit a location plan, site plan, elevations, manufacturer's specifications and any other pertinent material or issues relevant to the proposed development. The proponent must provide an assessment, based on industry best practice, of the measures it expects will be necessary to implement and complete the decommissioning, rehabilitation and end-of-life activities for the site as set out in the development approval. The foregoing assessment must be accompanied by an indicative cost estimate of the anticipated decommissioning, rehabilitation and end-of-life work programme.

To provide clarity and certainty as to the final cost of decommissioning, rehabilitation and endof-life work programme, the developer, or any successor, must on each subsequent ten-year anniversary, conduct and provide an independently assessed estimate of the costs of an industry best practice decommissioning, rehabilitating and implementation of the end-of-life plan for the site.

These details will be necessary to demonstrate compliance with the Shire of Moora Local Planning Scheme No. 4 (and its successors) and relevant legislation, including the Environmental Protection (Noise) Regulations 1997.

Applications for renewable energy facilities, utility installations, transmission and storage networks and future technologies located near or adjacent to properties or buildings identified on the Shire's Heritage List or Municipal Inventory of Heritage Places, will require a written submission by a suitably qualified person (e.g. a qualified Heritage Advisor) justifying or supporting the location, unless determined otherwise by the Shire's Planning Services in consultation with the State Heritage Office.

Renewable energy facilities, utility installations, transmission and storage networks and future technologies shall be designed and sited to minimise adverse impacts on the community and environment and be based on a combination of industry best practice, published industry standards, regulatory frameworks, and local government authority requirements, whichever is the more authoritative and accepted methodology.

Adequate setbacks and safety measures shall be incorporated to protect public health and safety against major breakdown of, or incidents at, renewable energy facilities, utility installations, transmission and storage networks and future technologies sites and their associated infrastructure. The minimum recommended setback from property boundaries shall be set on a case-by-case basis, negotiated between the landowner and proponent, or consistent with industry best practice and or any regulated standards or provisions.

#### Transmission Line Reserves

Where a reserve or easement, such as a road reserve, is identified on a locality or site plan or

map, that reserve or easement must be investigated and assessed as a priority for the purpose

of potential dual use as a transmission / pylon / services / component corridor or as an access road before any plans for new works are considered and approved.

Where transmission lines traverse, and pylons are situated on adjacent land, which itself does not host a wind turbine/s or any other renewable energy system components, the developer must assess as a priority, reserves or easements for the purpose of potential dual use as a transmission / pylon / services / component corridor or as an access road before any plans for alternative works are considered and approved.

This applies regardless of whether a reserve / easement or road is, or is not, shown on a locality or site plan / map and whether the feature has been developed for a purpose or not.

It is the developer's responsibility to ensure the order and coordination of infrastructure to avoid loss of visual and situational amenity.

This information should accompany the development application.

## End-of-Life Decommissioning / Rehabilitation / Repurposing / Recycling

End-of-life, and or decommissioning plans must be submitted and approved as part of the development application. These plans must demonstrate principles of recycling, repurposing, and rehabilitation consistent with published industry best practice or where they exist, state or commonwealth regulatory frameworks. Plans should include the following:

## 1. Life Cycle Reusability Assessment:

- Proponents must provide a comprehensive plan demonstrating the purposeful and sustainable reuse or recycling of engineered structures and concrete footings where necessary, at the end of their useful life.
- Proponents should include examples of demonstrable planned actions / suggestions for the disposal or repurposing of masts, blades, transmission infrastructure and cabling based on demonstrably proven science and industry best practice.

## 2. Financial Responsibility for End-of-Life Measures:

- Proponents are required to provide an independent estimate of the financial costs associated with ensuring a sustainable end state outcome at the conclusion of the renewable energy facility's designed life cycle as described above.
- Acceptable options for financing end-of-life programmes include:
  - a. Establishment of a sinking fund.
  - b. Creation of a protected, cash-backed asset, serving as a condition on the land with obligations passed on to successive landowners and developers / business.
  - c. Irrevocable, non-transferrable bank guarantee, bond, trust fund or parent company guarantee.
- Release of funds from the agreed facility to the original (or a subsequent) depositor cannot occur until a successor operator / company / developer deposits an equivalent sum into the agreed facility. This machinery will apply to each developer in the chain of developers throughout the life of the development.

- Funds in the facility will be protected from claims by a trustee in bankruptcy, liquidator, or default on debts by the company.
- 3. Compliance and Monitoring:
  - Ongoing monitoring will be conducted to ensure compliance with the sustainable endof-life measures outlined in the proposal.
  - Non-compliance may result in penalties and revocation of development approvals.
- 4. Community Engagement:
  - Proponents are required to engage with the local community to address concerns and provide transparency regarding the adoption of sustainable practices.

Developers are required to include a Site Rehabilitation Plan detailing the steps for future decommissioning of facilities. The plan should consider the impact of buried cables and turbine foundations on seeding depth and crop / pasture root potential. The plan must provide for decommissioning to a minimum of "normal deep ripping depth" to ensure adequate depth for breaking up compacted soil layers in the future.

#### Community and Stakeholder Consultation

Developers must actively engage in meaningful community and stakeholder consultation prior to lodgement of any formal development application and throughout the project's lifecycle. They are to ensure that residents and stakeholders are continuously informed and have genuine opportunities to provide feedback throughout the life of the project. Consultation shall include public meetings, information sessions, and other appropriate methods to engage with the community. Developers are encouraged to make use of the "*Guide to Best Practice Planning Engagement in Western Australia (2023)*", published by DPLH, when implementing Community Consultation.

Developers should inform themselves as to the relevant stakeholders with whom they should consult early in the process; these stakeholders include but are not limited to the Shire, Main Roads WA, Western Power, Civil Aviation Safety Authority (CASA), Air Services Australia, Royal Flying Doctor Service (RFDS), Department of Fire and Emergency Services (DFES), Department of Planning, Lands and Heritage (DPLH), Department of Water and Environmental Regulation (DWER), Department of Biodiversity, Conservation and Attractions (DBCA), Department of Primary Industries and Regional Development (DPIRD), Environmental Protection Authority (EPA), local aerial spraying contractors, unlicenced airstrip owners (within a 5km radius of any turbine) and any relevant incorporated local aeronautical associations. It is the proponent's responsibility to broadly canvas all potential stakeholders and individuals.

The outcome of the Community and Stakeholder Consultation should be included in the lodgement of a detailed Community and Stakeholder Engagement Plan. It should articulate the outcomes of the pre-lodgement Community and Stakeholder consultation.

## Community Benefit Fund

The development of renewable energy facilities associated transmission and storage infrastructure, and future technologies has in some communities created significant unrest and community

fractures due to perceived community intrusion, a loss of amenity, disruption of civil society and

unequal distribution of benefits.

A best practice model of providing community benefit resides in the establishment of a Community Benefit Fund Agreement (CBFA). This model provides for the Shire and developer to establish by formal agreement, a Community Benefit Fund Agreement that receives endowments / grants / legacies / donations from the developer.

Developer contributions to the Fund will be based on a meaningful contribution that is negotiated by Council and the Developer based on the renewable energy installation's certified output capacity. Contributions in respect of subsequently installed renewable energy facilities of greater capacity will be commensurate with the replacement unit's increased certified output or operating capacity.

The developer's payments would be staggered to provide for an initial payment of 50% upon final investment decision (FID) and 50% on the day each unit completes its operational readiness testing.

Payments into the trust fund will be non-transferrable, non-redeemable and non-tradeable; they will be applied for the exclusive purpose of providing for the betterment of the community.

The trust fund will be administered by a Board of Governors comprising representatives of the Shire, the Moora Chamber of Commerce and Industry, an expert in finance/banking/law, the community, and the developer.

#### Environmental Impact

A comprehensive environmental impact assessment by a suitably qualified environmental consultant (independent of the developer), including flora and fauna studies, shall be conducted, and submitted as part of the development application. Consideration of environmental impacts during both construction and operational stages of the development is a mandatory requirement of the development application.

Developers must implement measures to mitigate and manage potential environmental impacts, including habitat protection and rehabilitation, including but not limited to;

- Important Bird Areas (IBAs) in Walebing, Moora town and South of Moora in respect of the endangered Carnaby Cockatoo.
- Fauna sites containing protected spider orchids.
- Stopover, rest sites, roosting and nesting sites, for local birds of conservation significance.
- Locations of birds of significance conservation colonies.
- Areas of high raptor breeding and activity.
- Livestock disturbance; and
- The cumulative impact of wind turbines on bird migration routes.
- Any factors relevant to the consideration and assessment of other the potential impacts that require individual consideration or assessment.

Developers are to submit a biosecurity management plan to ensure all excavation equipment / drilling-rigs, and the machinery are thoroughly cleaned and free from any soil / plant or other organic material prior to leaving paddocks, and especially when moving from property to property.

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#### Visual and Landscape Impact

Renewable energy facilities shall be designed to the greatest extent possible, to integrate sympathetically into the natural and rural landscape setting to minimise visual disruption and loss of amenity. A visual and Landscape Impact Assessment is required to address the following:

- landscape significance and sensitivity to change, site earthworks, topography, the extent, and type of vegetation, clearing and rehabilitation areas, land use patterns, built form character, public amenity, and community values;
- impact on views including the visibility of the facility using view shed analysis and simulations
  of views from significant viewing locations including residential areas, major scenic drives
  and lookouts;
- layout of the facility including the number, height, scale, spacing, colour, surface reflectivity and design of components, including any ancillary buildings, signage, access roads, and incidental facilities; and
- measures proposed to minimise unwanted, unacceptable, or adverse visual impacts.

It is recommended that the developer include reference to the *WAPC Visual Landscape Planning Manual,* and the *Windfarm and Landscape Values* (2005) published by the Western Australian Wind Energy Association and Australian Council of National Trust.

## Noise Impact

Because of their tendency to create noise, renewable energy facilities shall be designed and operated to minimise noise emissions.

A noise impact assessment, including infrasound and ground vibration, to be completed by an acoustic consultant, shall be prepared demonstrating compliance with the Environmental Protection (Noise) Regulations 1997 for both construction and operational phases. The noise impact assessment is to have due regard to future land uses.

It is recommended that any wind turbine unit be located no closer to any dwelling or sensitive land use than the minimum applicable standard at the time of installation, best industry practice or unless a written agreement is entered into with impacted landowners.

The Environmental Noise Branch section of the Department of Water and Environmental Regulation recommend an alternative noise criterion of 40dBLA10, whichever is the greater or the applicable LA10 assigned noise level, to be achieved at those residences associated with the project

(accommodation for renewable energy staff, or caretaker residence).

To accurately assess noise levels from wind turbines, measurements shall be taken from the extremity or tip of the blade of the wind turbine in its horizontal position, which is closest to the noise-sensitive premise being measured against or for. It is acknowledged that the head of the turbine rotates with wind direction, and consequently, the blades themselves, depending on their length, may extend up to one hundred metres closer to the noise-impacted premise that the structure. This approach ensures that noise measurements capture the most relevant and representative data regarding potential impacts on nearby premises.

Noise impact measurements, conducted over a minimum period as defined by relevant standards, must consider atmospheric and climatic conditions that promote noise transmission, particularly during times typically experienced at the location. This includes early morning periods, low wind conditions, and early morning fog, all of which can amplify noise transmission. Additionally, seasonal, or prevailing winds that may enhance noise transmission towards the relevant premise must also be considered during the assessment.

#### Bushfire

Developers are to provide a Bushfire Management Plan for areas that fall within the Bushfire Prone Area. Reference should be made to *State Planning Policy 3.7 – Planning in Bushfire Prone Areas* (SPP 3.7). It is recommended that the developer review the Victorian Country Fire Association's document - *Design Guidelines and Model Requirements for Renewable Energy Facilities v4 (2023)*, as this document provides a best practice approach to considering bushfire risk and fire safety measures in the design, construction, and operation of renewable energy facilities (including windfarms).

## Safe Work Zone

Developers must provide the local government with a copy of any safe work method statement relating to the operation of the proposed turbines for when they are operational. This information will assist in evaluating and determining any setback from boundaries and any adverse potential impact on adjoining landowners and neighbours, who always retain entitlement to the full enjoyment and improvement of their property, unless a written agreement with that landowner states otherwise.

## Tourism

Developers are to consider the impact of tourism traffic and the risk of traffic congestion or vehicle accidents by providing a suitable viewing platform or pull off bays with appropriate interpretation and signage and to consult with the Shire of Moora and / or Main Roads WA on suitable and agreed location(s).

#### Other Potential Impacts

Developers must assess and address any other potential impacts or risks, such as electromagnetic interference or shadow flicker.

All identified potential impacts shall be mitigated to the greatest extent possible by the developer to protect the interests of the community.

Developers are required to take into consideration the Moora Aerodrome and the Aerodrome Master Plan's future planning, when developing wind farm/turbines within close proximity to the area, so as not to impact the operation and activities of aerodrome users including any aeronautical, gliding, and flying associations operating within the Shire. Consultation with relevant government authorities and airport operators will be required.

Developers of wind turbine proposals should refer to *the National Aviation Safeguarding Framework (NASF) Guideline D: Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms) / Wind Monitoring Towers* to determine any potential aviation safety risks and mitigation measures. Any potential aviation safety risks identified require consultation with the Civil Aviation Safety Authority (CASA), Air Services Australia and/or the Commonwealth Department of Defence.

The NSAF guideline identifies consultation with unlicensed aerodrome owners and CASA/Air Services. CASA has released an advisory circular AC 139.E-05v1.1 Obstacles (including renewable energy s) outside the vicinity of a CASA certified aerodrome.

All renewable energy and turbine developments must adhere to and comply with the regulations, specifications, and requirements outlined by the Civil Aviation Safety Authority (CASA), as though the Moora Aerodrome were registered. This ensures that the development does not impede the potential future upgrade of the Moora Aerodrome from its current unregistered CASA uncertified status to that of a Registered CASA certified Airport. Consultation with relevant government authorities and airport operators will be required.

Renewable energy proposals should not have negative impact through interference with normal agricultural or farming activities of nearby rural properties, such as aerial spraying. An aviation assessment by a suitable qualified aviation consultant may be required to demonstrate turbines will not impact on aerial spraying activities of surrounding farms or unlicenced airstrips.

Developers are required to provide a surface water management plan, incorporating appropriate design methods to manage water erosion from intense summer or winter rainfall events.

This local planning policy on Renewable energy s/Turbines is designed to guide future development while ensuring the preservation of the Shire of Moora's unique character and the wellbeing of its residents. Developers and relevant authorities are encouraged to adhere to these guidelines for the responsible and sustainable development of wind energy projects within the Shire.

## Road Contributions for Renewable Energy Facilities and Associated Infrastructure

The Shire of Moora recognises that the development of wind energy facilities may have significant impacts on the condition and serviceability of the local road network, especially during the construction phase. The Shire of Moora requires proponents of wind energy facilities to be assessed for any road contributions for repairs or upgrades to sealed and/or unsealed roads managed by the Shire of Moora because of construction, or ongoing activities associated with the development beyond those considered normal day to day access and egress.

To adequately address and meet the impact of heavy transport road use, the developer will be required to enter into a road user agreement for the duration of the project to provide for the costs of repair and maintaining roads, bridges, curbs, channelling, culverts, guideposts, signage and any other unanticipated impacts on the Shire's Road network. This agreement must accompany the developer's development application.

Reference should be made to the WAPC *Transport Assessment Guidelines*. The Traffic Assessment should consider:

- Operation and Maintenance Agreements to Access State Road Network Main Roads Western Australia.
- Route Assessments for the transport of dangerous goods on road network.
- A traffic management plan in conjunction with an application for a permit that requires vehicle and machinery access and movement for Restricted Access Vehicles shall be submitted for approval to the satisfaction of Heavy Vehicle Services Main Roads Western Australia. (e.g. Transport of large wind turbine blades and towers).

The Developer will be responsible for:

- Preparation of a pre-development "Road and Shire infrastructure condition" report, which identifies and records the conditions of any local roads and the Shire Infrastructure that will be affected by any route for heavy vehicles and delivery trucks needed for the construction phase;
- The costs associated with any damage caused to the roads or Shire infrastructure attributed to the construction phase of the development. Any damage shall be rectified by the developer to the standard identified in the pre-lodgement "Road and Shire Infrastructure Condition" report.
- All costs of any upgrading required for construction transport routes and/or the development.

The road contributions will be calculated based on the Western Australia Local Government Association's (WALGA) *Heavy Vehicle Cost Recovery Policy Guideline for Sealed Roads*, which provides a fair and transparent method for determining the additional maintenance and reconstruction costs attributable to the increased heavy vehicle traffic generated by the wind energy facility development. Any contributions need to be consistent with the principles that underpin the State Planning Policy 3.6 – Infrastructure Contributions.

The road contributions will be negotiated and agreed upon between the Shire of Moora and the developer prior to the approval of the development application. The road contributions will be paid by the developer to the Shire of Moora in accordance with the terms and conditions of the agreement. The Shire of Moora will use the road contributions to fund the necessary road works to maintain and improve the safety and functionality of the local road network.

No works can occur within a State Road Reserve without Main Roads approval.

- End of Policy

Acoustic Consultant	A person who meets <i>each</i> of the following criteria:
	<ul> <li>holds a recognised tertiary academic qualification that can be applied to the field of acoustics and the measurement and management of environmental noise.</li> </ul>
	<ul> <li>Has a minimum of three years practical experience working in the field of acoustics and the measurement and management of environmental noise.</li> </ul>
	<ul> <li>holds membership at the level or grade of Member or Fellow of the Australian Acoustical Society or membership of the Association of Australasian Acoustical Consultants, or international equivalent.</li> </ul>
Licence (or Access) agreem	
	A 'license' agreement, also known as an 'access' agreement, allows the developer rights to access a landholder's property for the purposes of surveys and assessments, typically for a specified duration of time. Activities may include the need to access the land to capture wind or solar resources data, undertake environmental and cultural surveys – as well as investigations, such as geotechnical, to determine the suitability of the site and feasibility of a project.
Option agreements	An 'option' agreement provides the developer with rights to lease or secure some or all of a landholder's property for the purposes of construction and operation of the project. Such an agreement should be in place for a specified period and may have the ability to extend the duration of the agreement beyond the original period.
Lease and Easement agreements	
	The lease agreement (or 'host' agreement) is a complex commercial lease that commits the landholder for an exceptionally long time and places significant obligations and responsibilities on the landholder.
Lease and Easement agreem	nents – preconstruction
	There can be a long period between a developer lodging a permit application for a project and commencement of construction. Typically, a developer must obtain the necessary permit approvals and then go on to arrange and confirm project finance, known as 'financial close' or 'financial investment decision.'
Lease and Easement agreem	nents – construction activities
	Construction activities can be particularly disruptive to the landholder for a period that may last several years. It is important that the landholder has a clear understanding of the extent of any potential impacts to the property during this phase and has discussed how these impacts may be managed or mitigated.
Lease and Easement agreen	nents – operational activities
<b>o</b> , e.e.	With lifespans of 25years to 50 years agreements in respect of the operational phase of renewable energy projects must recognise the complex ongoing nature of day-to-day operations of the developer and landowners. The most important aspect of this will be the unfettered 24-hour-7-day access to the property required by each party. This should be acknowledged in an operational agreement.
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#### Lease and Easement agreements - decommissioning

At the end of the operating life of a project, the expectation is that the wind or solar farm or transmission line will be decommissioned and all turbines, solar arrays, transmission lines and other infrastructure will be removed from the property, with the property returned to its original condition as agreed in the agreement.

It is current practice to expect that the developer will fund or reimburse the reasonable professional services costs incurred by the landholder in negotiating the various agreements.

Renewable Energy Facility The Shire of Moora Local Planning Scheme No 4. provides for the assessment and determination of a Renewable Energy Facility proposal in accordance with clause 3.2.4 as a Use not Listed, Clause 3(2)(a) of the Deemed Provisions (Schedule 2 Local Planning Regulations) and the Department of Planning, Lands and Heritage *Position Statement 2020* defined as "*Premises used to generate energy from a renewable energy source and includes any buildings or other structure used in, or relating to, the generation of energy by a renewable source. It does not include renewable energy electricity generation where the energy produced principally supplies a domestic and/or business premises and any on-selling to the grid is secondary.*"

Sensitive Land Use Means land uses that are residential or institutional or business in nature where people live or regularly spend extended periods of time. These include, but are not limited to residential dwellings, short stay accommodation, hospitals, educational establishments, childcare centres, corrective institutions, and places of worship.

Shadow Flicker A result of the sun's position as it travels across the sky relative to the rotation of the wind turbine's blades as they rotate. This occurs under certain combinations of geographical position and time of day. The seasonal duration of this effect may be calculated from the machine's certified specifications and geometry and the site's latitude and longitude. Shadow Flicker may be modelled in advance, and design and placement can mitigate the problem. This characteristic is more likely to be an issue for turbines located to the east or west of a dwelling.