



Emergency Management Guidelines for Wind Energy Facilities



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Other relevant considerations

Whilst CFA is not the responsible authority for Occupational Health and Safety or Dangerous Goods legislation it recommends that the following be considered, when planning, designing or developing Wind Energy Facilities

- Compliance with relevant statutory legislation and should implement safety and health management systems so as to mitigate hazard and risk;
- Hazard analysis and risk assessment undertaken in accordance with AS/NZSISO 31000 Risk Management – Principles and guidelines; and with HB203 Environmental Risk Management Principles and Processes;
- Development and implementation of emergency response plans detailing mitigation strategies to achieve specific outcomes as outlined in the State Planning Policy (SPP) 1/03 – Guideline for Mitigating the Adverse Impacts of Flood, Bushfire and Landslide; and maintain adequate separation of vegetation from exposures to prevent wildfire events threatening infrastructure in isolated areas;

Cover Image: Toora Wind Farm – South Gippsland, Victoria (CFA District 9).

Aim

The Emergency Management Guidelines for Wind Energy Facilities provide Wind Energy Facility operators with CFA's preferred safety measures to be considered when constructing and operating Wind Energy Facilities.

These principles should be considered at the design and planning stages of a wind energy project.

Application of the guidelines may vary throughout Victoria depending on the associated level of risk and should be implemented with the assistance of local CFA Brigades, Districts and Regions.

Context

Wind turbines manufactured today are required to meet accepted quality and safety standards. Despite this, CFA recognises that the risk of fire always exists when electronics and combustible oils and hydraulic fluids exist in the same enclosure. Wind farms can also be impacted by bushfire or grass fire entering the site.

There are a number of measures that can be put in place to reduce the likelihood of a fire occurring. These include both passive and active measures, such as;

- Lightning protection
- Non-combustible hydraulic and lubricant oils
- Heat barriers to protect combustible elements
- Heat and/or smoke detection systems, for early notification of fire
- Suppression systems, either water or foam that can contain a fire.

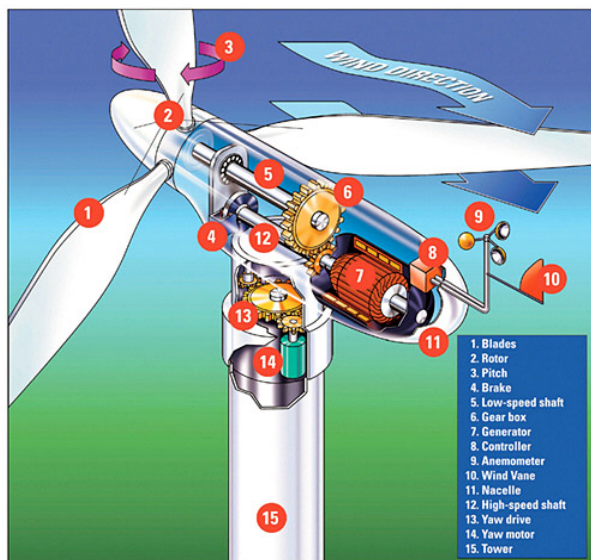
These guidelines provide advice on recommended fire safety measures for consideration when either building a new or upgrading an existing facility.



Wind energy facility in the landscape, including high voltage power lines and substations. Source: B. Gane.

The types of fire risks related to wind energy facilities may include:

- Nacelle (including turbine oil) fires;
- Electrical faults during construction or from connection lines;
- Firefighting limitations within and adjoining the wind farm footprint, such as limitations on aerial support, and access and egress conditions;
- Access to water sources within or adjoining the facility;
- Operation of winches and machinery during monitoring and maintenance tasks;
- Impacts from downwind air turbulence on fire behavior;
- Impacts of lightening



Wind turbine components. Source:
<http://www.alternative-energy-news.info/images/technical/wind-turbine.jpg>

CFA's involvement in Wind Energy Facilities extends only to implementing appropriate plans and response arrangements for incidents in and around these facilities, and therefore meeting its statutory responsibility for fire prevention and suppression. CFA's responsibility does not extend to regulating and certifying Wind Energy Facility building standards, operator's insurance arrangements, or operational restraints on the operator and maintenance staff.



Wake effect. Source: Danish Wind Energy Association Guide, 2003, pg. 34

Emergency Management Guidelines for Wind Energy Facilities

In accordance with the Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria (Department of Transport, Planning and Local Infrastructure (DTPLI), August 2011), Wind Energy Facility operators must develop a Bushfire Prevention and Emergency Response Plan as part of their Environmental Management Plan. The plan must be prepared in consultation with and to the satisfaction of CFA and the Department of

Environment and Primary Industry (DEPI). Section 5 of the Electricity Safety (Bushfire Mitigation) Regulations (2003) also requires that a Bushfire Mitigation Plan be prepared for approval by Energy Safe Victoria.

The requirements outlined below, have been specified to reduce the risk of fire in and around Wind Energy Facilities, during the planning, constructing and operating phases. The Bushfire Prevention and Emergency Response Plan and Bushfire Mitigation Plan must address the following measures:

Planning, Design and Development of Wind Energy Facilities

1. Consultation

- 1.1. The plan for the Wind Energy Facility needs to be forwarded to CFA for its consideration and to its satisfaction, in accordance with the above DPCD Planning guidelines.
- 1.2. Wind Energy Facility operators should include Operations Managers/Officers at CFA Region and District offices, as well as local CFA brigades, in the consultation process when designing the facility for the planning application. They should also be consulted regarding the consequent construction and operational stages.
- 1.3. An invitation should be made to fire brigades who are likely to respond to an incident at these site/premises.

2. Siting

- 2.1. Where practicable, Wind Energy Facilities should be sited on open grassed areas (such as paddocks grazed by cattle and sheep).
- 2.2. Clearing of vegetation, such as scrub, trees, etc. within 30 M of a turbine is recommended
- 2.3. Wind turbines should be located approximately 300 metres apart. This provides adequate distance for aircraft to operate around a Wind Energy Facility given the appropriate weather and terrain conditions. Fire suppression aircraft operate under "Visual Flight Rules". As such, fire suppression aircraft only operate in areas where there is no smoke and during daylight hours. Wind turbines, similar to high voltage transmission lines, are part of the landscape and would be considered in the incident action plan.
- 2.4. Adjoining property use and distances to habitable buildings need to be considered in the design of a wind energy, with regard made to turbine height and prevailing wind speeds.

3. Access

Adequate access to and within the Wind Energy Facility will assist CFA in responding to and managing fires on site. To enable access for fire appliances the following provisions should be considered:

- 3.1. Constructed roads should be a minimum of 3.5 metres in trafficable width (with 0.5m each side) with a four (4) metre vertical clearance for the width of the formed road surface.
- 3.2. Roads should be constructed to a standard so that they are accessible in all weather conditions and capable of accommodating a vehicle of 15 tonnes and 30 tonne, if a CFA aerial appliance, is within the District, for the trafficable road width.
- 3.3. Roads need to be accessible in all weather conditions
- 3.4. The average grade should be no more than 1 in 7 (14.4%) (8.1°) with a maximum of no more than 1 in 5 (20%) (11.3°) for no more than 50 metres.
- 3.5. Dips in the road should have no more than a 1 in 8 (12.5%) (7.1°) entry and exit angle.
- 3.6. Passing bays should be located every 200m on access tracks.

4. Water Supply

Appropriate location of water access points will assist safe, effective and timely fire suppression activities. To ensure adequate access to water for CFA, the allocation of static water supplies is necessary.

Location of water access points should be consistent with the type of risk that exists within the area. There may be a need for multiple treatments to address the type of risk and community requirements. In the event of a fire, water should be available and accessible to ensure that fire suppression activities are not hindered in any way and to ensure that fire appliances can identify and access water points efficiently.

Multiple tankers need to be filled rapidly and simultaneously to conduct efficient and effective fire suppression.

The following measures should be provided:

- 4.1. Water access points shall be located in safe, easily identifiable areas, accessible in all weather conditions.
- 4.2. Water access points should be designed, constructed and maintained for a load limit of at least 15 tonnes.
- 4.3. A turning circle with a minimum radius of 10 metres is required for fire appliances at all water access points.
- 4.4. Fire Brigade appliances should be able to park within four (4) metres of the water supply outlet on a hard standing area.
- 4.5. Bulk static water storages (22,500 Litre) should be provided adjacent to main access tracks for firefighting. The location and number of tanks should be determined in consultation with CFA Fire Safety Officers and Fire and Emergency Management staff. Tanks need to be of non-combustible materials.
- 4.6. All tanks shall be manufactured with at least one (and preferably two) 64mm, 3 thread/25mm x 50mm nominal bore British Standard Pipe (BSP) round male coupling 50mm from their base. Outlets should be a minimum of two (2) metres apart. Refer to Figure 1. Tanks and pipes should be made of non combustible material or shielded from radiant heat.
- 4.7. Water access points are to be marked by appropriate signage (Figure 2) or as per CFA's Guidelines for Identification of Street Hydrants for Fire Fighting Purposes.

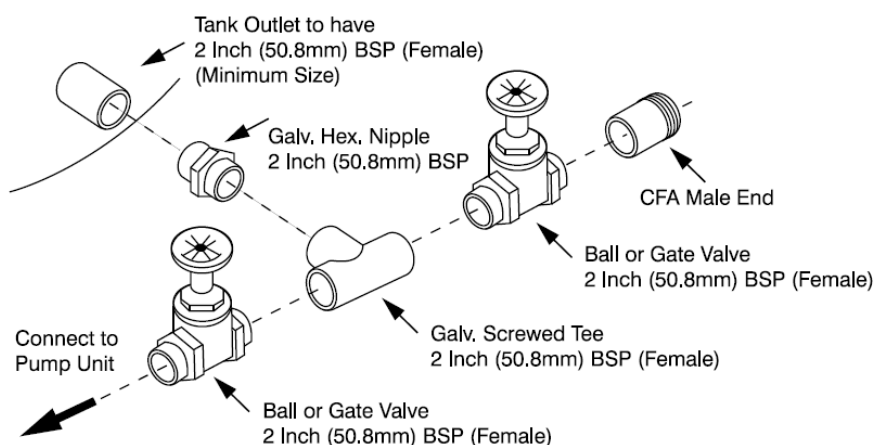


Figure 1. Requirements for fitting for above ground tanks.

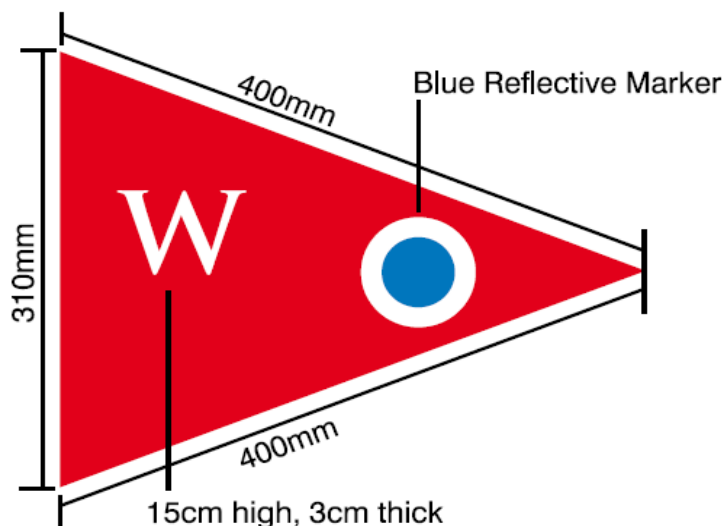


Figure 2. Appropriate Signage for Marking Water Access Points

5. Infrastructure

Sound engineering design using Australian Standards and principals of fire safety should be considered including:

- 5.1. Internal fire protection systems, where appropriate, to assist with fire suppression;
- 5.2. Lightning protection devices installed on each wind turbine;
- 5.3. Electrical and communications cables underground;
- 5.4. Dedicated monitoring systems within each wind turbine that detect temperature increases in the turbines, to either place turbine in a “safe state” or shuts them down when the threshold temperature is reached; and
- 5.5. Wind turbines should have a cut off system to prevent overheating when the temperature inside the nacelle is too high.

6. High Angle Rescue

- 6.1. CFA’s rescue guidelines should be considered to enable safe rescues. Contact the local CFA Region and/or District office for more information on this.
- 6.2. If turbine can be entered, the confined space rescue protocol including signage should be provided and Emergency Services informed.

7. Construction

During construction, pre-development monitoring activities and maintenance of a Wind Energy Facility, developers must:

- 7.1. Ensure that appropriate permits have been issued for work during Fire Danger Period and Total Fire Bans if required;
- 7.2. Adhere to restrictions on Total Fire Ban or high fire danger days (refer to www.cfa.vic.gov.au);
- 7.3. Carry fire extinguishers or firefighting equipment in vehicles;
- 7.4. Carry emergency communications equipment;
- 7.5. Vehicles should keep to the tracks whenever possible;
- 7.6. Restrict low clearance vehicles with catalytic converters from entering the site on high fire danger days; and
- 7.7. Restrict smoking to prescribed areas.

8. Operation and Maintenance of Wind Energy Facilities

- 8.1 Maintenance and repair activities that involve flame cutting, welding, and soldering (hot works) can increase the risk of fire. It is recommended that the establishment of a "Hot Work Permit" process be considered, in areas where combustible and/or flammable materials may be present.

9 Awareness and Training for Emergency Services

- 9.1 Within three months after commencement of the operations of the Wind Energy Facility operators should offer a familiarisation visit to the site and explanation of emergency service procedures to CFA and other emergency services, and training in relation to suppression of Wind Energy Facility fires and rescue.
- 9.2 Subsequent familiarisation sessions and training must be given to new emergency services personnel as required.

10 Fuel/Vegetation Management

Wind Energy Facility operators must ensure that the following fuel management measures are included in their plans during the Fire Danger Period:

- 10.1 Grass should be no more than 100mm in height and leaf litter no more than 10mm deep for a distance of thirty (30) metres around constructed buildings and viewing platforms;
- 10.2 A fuel reduced area of four-ten (4-10) metres width should be maintained around the perimeter of electricity compounds and sub station type facilities;
- 10.3 There should be no long grass or deep leaf litter in areas where plant and heavy equipment will be working;
- 10.4 A 10m wide bare earth break at the property boundary and at 100m from each turbine and other pieces of key infrastructure needs to be provided;
- 10.5 All plant and heavy equipment should carry at least one 9 Litre Water Stored Pressure fire extinguisher with a minimum rating of 3A, or firefighting equipment..
- 10.6 Adhere to restrictions and guidance during the Fire Danger Period, high fire danger days and Total Fire Ban days (refer to www.cfa.vic.gov.au).
- 10.7 Vehicles associated with the wind energy facility should carry 1 x 9 litre fire extinguisher with a minimum rating of 3A and rake hoe as a minimum when on site during the fire danger period, or equivalent firefighting equipment. Other equipment may be prescribed by the local CFA.

11 Evacuation procedures

- 11.1 Evacuation procedures for residents that may be impacted in the event of a nacelle fire should be informed of emergency procedures and recommended actions.

12 Operating temperatures

- 12.1 Wind turbine manufacturers provide specifications for safe operating conditions for temperature and wind speed.
- 12.2 A wind energy facility fire plan shall specify maximum operational wind speed and temperature conditions and operating procedures to limit fire risk.

13 Training for Facilitator Staff

Staff operating and/or working with this facility should be trained in:

- 12.1 Emergency Management arrangements
- 12.2 Any Fire Fighting Engineer they are expected to use
- 12.3 First Aid, as required by owner/operator
- 12.4 Hazards & risks associated with this facility should include Structural Fire, Chemical incident, Bushfire etc.

An annual emergency exercise should be conducted. Consideration should be given to inviting the local fire brigade to participate.

References

Australian Wind Energy Association (AusWEA) (2001) Wind Farm Safety in Australia,
http://www.auswind.org/WIDP/assets/BP11_Safety.pdf

Department of Planning and Community Development (2011) *Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria*. Victorian Government, Melbourne.

Danish Wind Industry Association Guide, Version 12 May 2003.

<http://www.alternative-energy-news.info/images/technical/wind-turbine.jpg>