Foreword

Victoria is seeing a transition from traditional energy generation to one that balances the old with the new renewable alternatives. Although the focus has been on the domestic generation of solar energy using photoelectric voltaic panels often supplemented with a battery storage system, the role commercial generation of energy plays cannot be underestimated.

Large commercial and industrial projects are being planned across the country. They range in size from small installations to supplement an individual company’s needs, to proposed projects as large as six square kilometres, comprising 700,000 panels and capable of generating about 200 megawatts of electricity – enough to supply clean energy to 80,000 average Victorian homes each year.

As well as solar power generation, there are other sustainable energy generation systems, such as wind, that are viable options in this area.

The 100MW Hornsdale power reserve in South Australia, which was the largest lithium-ion battery in the world, has demonstrated the role this technology can play in supporting a reliable power supply.

This new and emerging technology has outpaced the development of standards and guidance in relation to fire and emergency management. To bridge this gap, CFA has worked with various Victorian stakeholders to draft guidelines that can be used when designing a new facility or modifying an existing one. These guidelines cover topics such as siting, access, firefighting water, vegetation management and emergency management.

It’s important that all those with responsibilities in owning, managing and operating these facilities – large or small – are fully aware of, and understand, their responsibilities and obligations to ensure fire safety within their premises.

Fire safety not only makes good sense from a community safety point of view, it’s also a good risk-management business decision. CFA invites key stakeholders to consider these guidelines and work together to maintain and improve a satisfactory level of fire safety.

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Purpose of the Guidelines

The purpose of these guidelines is to provide details about standard measures and processes in relation to fire safety, risk and emergency management that should be considered when designing, constructing and operating new renewable energy facilities, and upgrading existing facilities.

Renewable energy facilities that support the generation of electricity in Victoria include wind farms, solar farms, and battery storage facilities, which are the focus of this guideline. The principles described may also apply to upcoming renewable technologies such as geothermal plants and landfill gas/biogas.

Structure of the Guidelines

This Guideline is structured in two parts: Part 1 contains conditions that apply to all renewable energy installations and facilities; Part 2 contains conditions specific to the type of facility: solar farms, wind farms and battery installations. CFA’s expectation is that all relevant conditions are addressed in the development of renewable energy facilities.

Part 1: Conditions for All Installations

1. Development of Installations

1.1 Consultation

The Country Fire Authority (CFA) has a statutory responsibility under The CFA Act (1958) for (the more) effective control of the prevention and suppression of fires in the country area of Victoria. For renewable energy installations, CFA’s involvement may be required in relation to planning permit approval, the assessment of dispensations under the Building Act and Regulations, and/or the provision of written advice in relation to dangerous goods storage and handling.

All design requirements need to take into consideration all the relevant Australian Standards.

Planning Permit Process

In the planning context, CFA’s involvement may be via referral from a municipal council (responsible authority) for CFA’s consideration and comment. If this occurs, this document is a guide as to the conditions CFA is likely to include in response to council’s referral. The conditions prescribed in this guideline should be incorporated by the applicant in the planning permit application.

Dangerous Goods Written Advice

Where the facility includes battery storage, CFA’s responsibility may include the provision of written advice under Regulations 54 and 55 of the Dangerous Goods (Storage and Handling) Regulations 2012. This advice will be issued by the State Infrastructure and Dangerous Goods Unit. The application form is available from:


Building Fire Safety Matters

Any building on site is required to comply with the National Construction Code. If a development has a building that will be over 500m², and dispensations are requested, the local delegated CFA fire safety officer will handle such applications. The application form is available from:


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1 Australian Standard – AS/NZS 5139:2017 ‘Electrical installations – Safety of battery systems for use with power conversion equipment’ was in draft at the time of publication of these guidelines.
**Occupational Health and Safety Requirements**

Any new development needs to ensure that the design of plans and infrastructure installations consider the requirements of the *Victorian Occupational Health and Safety Act 2004 (OHS Act)* and the *Occupational Health and Safety Regulations (2017)*.

Section 28 of the OHS Act, states the following in relation to the duty of designers:

“A person who designs a building or structure or part of a building or structure who knows, or ought reasonably to know, that the building or structure or the part of the building or structure is to be used as a workplace must ensure, so far as is reasonably practicable, that it is designed to be safe and without risks to the health of persons using it as a workplace for a purpose for which it was designed.”

Owners/occupiers have obligations under the OHS Act to ensure the health and safety of people ‘so far as is reasonably practicable’. This legislation requires consideration of risk control measures and safe systems of work, which for renewable energy installations may relate to the development of systems and activities for:

- Housekeeping
- Security (monitoring, alarms, etc)
- Undertaking hot works
- Ignition source control
- Vehicle, plant and equipment maintenance requirements.

**Information Provision**

To enable CFA to provide timely and accurate advice, the following information is required to be provided at the planning and design stage:

- Details of the facility, its operation, size and type
- Details of any buildings on-site, their floor area, class and use (eg inverter plant room, substation, maintenance shed, office)
- Details of any battery, diesel or other dangerous goods storage/handling, including the class identification, quantity, type (bulk or packaged) and location
- Details of the proposed fire protection system for the site and design standards.

**1.2 Planning, Design and Construction**

The design team should consult with CFA as a key stakeholder early in the planning and design phase to ensure that CFA can consider the implications of the design on emergency response. Plans for the facility can be forwarded to CFA for consideration prior to a consultation meeting. Documentation is to be submitted to firesafetyreferrals@cfa.vic.gov.au.

Where any proposed facility design does not or is unable to meet the requirements of this guideline, designers are to contact CFA’s State Infrastructure and Dangerous Goods Unit for design review and advice.

The construction and commissioning phases of facility development pose challenges for effective risk management. During construction of any renewable energy installation, site occupiers must:

- Develop an Emergency Management Plan for the construction and commissioning phases
- Ensure that appropriate permits have been issued for work during the Fire Danger Period, and that any conditions on permits are adhered to
- Adhere to restrictions on Total Fire Ban or days of high fire danger (refer to www.cfa.vic.gov.au)
- Carry fire extinguishers or firefighting equipment in vehicles
- Carry emergency communications equipment
- Ensure vehicles keep to tracks whenever possible
- Restrict smoking to prescribed areas, and provide suitable ash and butt disposal facilities.

The fire protection measures contained within this guideline should be installed during the construction phase. This will ensure that the site has appropriate fire protection during this phase.
1.3 Further Guidance Material

The Victorian Government has developed some guidance material that should be read in conjunction with this guideline. They include:

- **Community Engagement and Benefit Sharing in Renewable Energy Developments**


2. Emergency Management

2.1 Risk Management

A risk management process that meets occupational health and safety requirements for eliminating or reducing risk so far as is reasonably practicable provides the foundation for effective emergency and fire management planning. CFA’s expectation is a precaution-focused approach to risk management whereby risk is managed as far as practical to do so, and not to a particular ‘risk level’. Risk management involves the following.

2.1.1 **Risk identification** to understand the potential sources of fire including: on-site hazards (eg electrical faults, operational faults, chemical releases, operational practices/processes, animal management); off-site hazards (eg bushfire, grassfire, storm, lightning, flood); and any other operational, financial or strategic risks that could affect the ability of the organisation or operation to meet objectives.

2.1.2 **Risk analysis and risk evaluation** involves identifying the nature of risk and its characteristics, and analysis of controls for identified risks based on the hierarchy of controls and informed by industry good practice. Analysis includes evaluation of controls based on assessment of their effectiveness and the practicality of their implementation.

2.1.3 **Risk treatment** involves the selection and implementation of controls for each identified risk.

2.1.4 **Monitoring and review, recording and reporting** involves regular and comprehensive review of risks and controls through: monitoring of site hazards, risks, systems and processes to ensure that emerging risks are identified; existing risks are effectively controlled; and controls are appropriate and effective. Risk management activities and outcomes are to be communicated across the organisation.

Risk management should be comprehensive and consultative, involving those who will work at the facility (employees and contractors); include analysis of activities and operations at the facility; and take into consideration previous fires at similar facilities in Australia and globally. Risk management should be organisation-wide, supported by organisational management at all levels, underpinned by organisational policy, and integrated into organisational decision-making.


Section 113A of the *Electrical Safety Act 1998* and Section 6 of the *Electricity Safety (Bushfire Mitigation) Regulations 2013* require that a bushfire mitigation plan be prepared for approval by Energy Safe Victoria.
2.2 Emergency Management Plan (Incorporating a Fire Management Plan)

CFA requires that facility operators develop an emergency management plan consistent with the requirements of Australian Standard 3745: Planning for emergencies in facilities. The emergency management plan is to include:

2.2.1 Emergency prevention, preparedness and mitigation activities

2.2.2 Activities for preparing for, and prevention of emergencies (eg training and maintenance)

2.2.3 Control and coordination arrangements for emergency response (eg evacuation procedures, emergency assembly areas and procedures for response to hazards)

2.2.4 The agreed roles and responsibilities of on-site personnel (eg equipment isolation, fire brigade liaison, evacuation management).

To facilitate fire brigade response, CFA’s expectation is that the emergency management plan includes:

2.2.5 Facility description, including infrastructure details, activities and operating hours

2.2.6 A site plan containing infrastructure (solar panels, wind turbines, inverters, battery storage, generators, diesel storage, buildings), site entrances, exits and internal roads; fire services (water tanks, fire hydrants, fire hose reels); and neighbouring properties

2.2.7 Up-to-date contact details of site personnel and any relevant off-site personnel who could provide technical support during an emergency

2.2.8 A manifest of dangerous goods (if required under the Dangerous Goods (Storage and Handling) Regulations 2012)

2.2.9 Emergency procedures for credible hazards and risks, including fire

2.2.10 Procedures for notifying the emergency services

2.2.11 Procedures for evacuating personnel.

2.2.12 A fire management plan includes all of the fire mitigation measures that will be implemented to reduce the risk of fire, established through a risk management process. A fire management plan may specifically address:

- Risk management measures specific to fire (as above)
- A fuel (vegetation) reduction and maintenance plan/procedure.

CFA’s expectation is that the fire management plan forms part of the emergency management plan; where the hazards/risks and controls are identified and implemented to ensure fire risk is managed so far as is reasonably practicable, and the activities associated with fuel reduction and maintenance are captured in the organisation’s standard operating procedures.

2.3 Provision of Emergency Information

CFA requires the installation of emergency information containers at each vehicle entry to the site, each containing an emergency information book consisting of:

2.3.1 A description of the premises, its infrastructure and operations

2.3.2 Site plans that include the layout of the entire site, including buildings, internal roads, infrastructure, fire protection systems and equipment, dangerous goods storage areas, drains and isolation valves, neighbours and the direction of north

2.3.3 Up-to-date contact details for site personnel, regulatory authorities and site neighbours

2.3.4 A manifest of dangerous goods (if required) as per Schedule 3 of the Dangerous Goods (Storage and Handling) Regulations 2012.

2.3.5 Safety data sheets for all dangerous goods stored on-site

2.3.6 Procedures for management of emergencies, including evacuation, containment of spills and leaks, and fire procedures.
CFA requires that the emergency information container be:

2.3.7 Painted red and marked ‘EMERGENCY INFORMATION’ in white contrasting lettering not less than 25mm high

2.3.8 Located at all vehicle access points to the facility, installed at a height of 1.2m - 1.5m

2.3.9 Accessible with a fire brigade standard ‘003’ key.

2.4 Fire Brigade Site Familiarisation and Exercises

2.4.1 Prior to commissioning the facility, operators should offer a familiarisation visit and explanation of emergency service procedures to CFA and other emergency services. Information in relation to the specific hazards and fire suppression requirements of the site should be provided to CFA during this visit. Contact with the local CFA district to arrange local brigade contact. Refer to https://www.cfa.vic.gov.au/contact/#district

2.4.2 A schedule for ongoing site familiarisation to account for changing personnel, site infrastructure and hazards should be developed in conjunction with the local CFA brigade.

2.4.3 An annual emergency exercise should be conducted at the site, with an invitation extended to the local CFA brigade to participate.

2.5 Training for Facility Staff

Staff operating and/or working in this facility are required to be trained and aware of:

2.5.1 Site and operational risks and hazards

2.5.2 Site emergency management roles, responsibilities and arrangements

2.5.3 The use of any firefighting equipment where there is an expectation for staff to undertake first aid firefighting

2.5.4 The storage, handling and emergency procedures for dangerous goods on-site

2.5.5 The location of first-aid facilities and application of first aid equipment.

3. Site Infrastructure

3.1 Access

Adequate access to and within the facility will assist CFA in responding to and managing fires on-site. To enable access for fire vehicles, CFA requires that the following provisions be considered:

3.1.1 A four (4) metre perimeter road should be constructed within the ten (10) metre perimeter fire break.

3.1.2 Roads are to be of all-weather construction and capable of accommodating a vehicle of 15 tonnes.

3.1.3 Constructed roads should be a minimum of four (4) metres in trafficable width with a four (4) metre vertical clearance for the width of the formed road surface.

3.1.4 The average grade should be no more than 1 in 7 (14.4% or 8.1°) with a maximum of no more than 1 in 5 (20% or 11.3°) for no more than 50 metres.

3.1.5 Dips in the road should have no more than a 1 in 8 (12.5% or 7.1°) entry and exit angle.

3.1.6 Incorporate passing bays at least every 600m which must be at least 20m long and have a minimum trafficable width of 6m. Where roads are less than 600m long, at least one passing bay is to be incorporated.

3.1.7 Road networks must enable responding emergency services to access all areas of the facility.

3.1.8 The provision of at least two (2) but preferably more access points to the site, to ensure safe and efficient access to and egress from areas that may be impacted or involved in fire. The number of access points should be informed through a risk management process.
3.2 Firefighting Water Supply

The location of firefighting water access points and the quantity of water supply is to be established through a comprehensive risk management process that considers the credible hazards. In the event of a fire (either structural fire or bushfire), sufficient water must be available and accessible to fire trucks to ensure that fire suppression activities are not hindered in any way. Water access points must be clearly identifiable and unobstructed to ensure efficient access.

On-site water supply is an important part of the fire suppression system which will assist in the safe, effective and timely fire suppression activities of responding brigades.

Static water storage tank installations are to comply with Australian Standard 2419.1 *Fire hydrant installations System design, installation and commissioning* and the following conditions.

3.2.1 The static water storage tank shall be of not less than 45,000 litres effective capacity. The static water storage tank(s) must be an above-ground water tank constructed of concrete or steel. The location and number of tanks should be determined as part of the site’s risk management process and in consultation with a CFA delegated officer.

3.2.2 The static storage tanks shall be capable of being completely refilled automatically or manually within 24 hours.

3.2.3 The hard-suction point shall be provided, with a 150mm full bore isolation valve (Figure 1) equipped with a Storz connection, sized to comply with the required suction hydraulic performance. Adapters that may be required to match the connection are 125mm, 100mm, 90mm, 75mm, 65mm Storz tree adapters (Figure 2) with a matching blank end cap to be provided.

3.2.4 The hard-suction point shall be positioned within 4m to a hardstand area and provide clear access for fire personnel.

3.2.5 An all-weather road access and hardstand shall be provided to the hard-suction point. The hardstand shall be maintained to a minimum of 15 tonne GVM, 8m long and 6m wide or to the satisfaction of the relevant fire authority.

3.2.6 The road access and hardstand shall be kept clear at all times.

3.2.7 The hard-suction point shall be protected from mechanical damage (ie bollards) where necessary.

3.2.8 Where the access road has one entrance, a 10m radius-turning circle shall be provided at the tank.

3.2.9 An external water level indicator is to be provided to the tank and be visible from the hardstand area.

3.2.10 Signage (Figure 3) shall be fixed to each tank.

![Figure 1: 150mm full bore isolation valve.](image1)

![Figure 2: 125mm, 100mm, 90mm, 75mm, and 65mm Storz tree adapters.](image2)
3.2.11 Signage (Figure 4) shall be provided at the front entrance to the site, indicating the direction to the static water tank and being to the satisfaction of a CFA delegated officer.

3.3 Dangerous Goods Storage and Handling

3.3.1 The requirements of the relevant Australian Standards must be complied with, e.g. (DR) Australian Standard 5139: Electrical installations – Safety of battery systems for use with power conversion equipment; Australian Standard 3780: The storage and handling of corrosive substances; and Australian Standard 1940: The storage and handling of flammable and combustible liquids.

3.3.2 Signage and labelling compliant with the Dangerous Goods (Storage and Handling) Regulations 2012, and the relevant Australian Standards is to be provided.

3.3.3 All dangerous goods stored on-site must have a current safety data sheet (SDS). Safety data sheets must be contained in the site’s emergency information book, in the emergency information container.

3.3.4 Appropriate material (including absorbent, neutralisers, equipment and personal protective equipment) for the clean-up of spills is to be provided and available on-site.
4. Site Operation

4.1 Operation and Maintenance of Facilities

4.1.1 Maintenance and repair activities that involve flame cutting, grinding, welding or soldering (hot works) are to be performed under a ‘hot work permit’ system or equivalent hazard or risk management process.

4.2 Fuel/Vegetation Management

All renewable energy installations that are constructed within the Bushfire Management Overlay or a Bushfire Prone Area must maintain the vegetation to the prescriptions listed within the planning permit conditions.

Facility operators are to undertake the following fuel management measures during the Fire Danger Period:

4.2.1 Grass is to be maintained at below 100mm in height during the declared Fire Danger Period.

4.2.2 A fire break area of ten (10) metres width is to be maintained around the perimeter of the facilities, electricity compounds and substations. This area is to be of non-combustible mulch or mineral earth.

- The fire break area must commence from the boundary of the facility or from the vegetation screening (landscape buffer) inside the property boundary.
- The fire break must be constructed using either mineral earth or non-combustible mulch such as crushed rock.
- The fire break must be vegetation free at all times.
- No obstructions are to be within fire break area (eg no stored materials of any kind).

![Figure 5: Typical cross section indicating fire break requirements.](image)

4.2.3 Adhere to restrictions and guidance during the Fire Danger Period, days of high fire danger and Total Fire Ban days (refer to www.cfa.vic.gov.au).

4.2.4 All plant and heavy equipment is to carry at least a 9-litre water stored-pressure fire extinguisher with a minimum rating of 3A, or firefighting equipment as a minimum when on-site during the Fire Danger Period.

4.2.5 There is to be no long grass or deep leaf litter in areas where plant and heavy equipment will be working.
Part 2: Additional Conditions Specific to Facility Type

These are conditions to be complied with in addition to those listed in Part 1 of this guideline.

5. Wind Facilities

5.1 Siting for Wind Facilities

5.1.1 Where practicable, wind energy installations can be sited on open grassed areas (such as grazed paddocks). Vegetation is to be managed as per the requirements of this guideline, or as informed through a risk management process.

5.1.2 Wind turbines are to be located no less than 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 can operate during the day or night.

5.1.3 Installed weather monitoring stations can be high and difficult to see and are hazardous to CFA flight operations during fires. CFA requires the following in relation to the installation of these monitoring stations:

- Monitoring towers higher than 100 feet must be clearly marked and guy wires fitted with markers
- The installation must be notified to CFA and Geoscience Australia (for inclusion in the Vertical Obstruction Database).

5.1.4 Adjoining property use and distances to habitable buildings must be considered in the design of wind energy installations, with regard made to turbine height and prevailing wind speeds.

5.2. Operation and Maintenance of Wind Facilities

5.2.1 Wind turbine manufacturers must provide specifications for safe operating conditions for temperature and wind speed. This information must be provided within the content of the emergency information book.

5.2.2 A wind energy facility emergency plan must include maximum operational wind speed and temperature conditions and operating procedures to limit fire risk. This information must be provided within the content of the emergency information book.

6. Solar Facilities

6.1 Siting for Solar Facilities

6.1.1 Solar facilities are to have a 6 metre separation between solar panel banks/rows.

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Figure 6: Six metre separation between solar panel banks.
6.2 Operation and Maintenance of Solar Facilities

6.2.1 Solar farm operators must provide specifications for safe operating conditions for temperature and the safety issues related to electricity generation, including isolation and shut-down procedures, if solar panels are involved in fire. This information must be provided within the content of the emergency information book.

6.3 Fuel/Vegetation Management at Solar Facilities

6.3.1 Solar arrays are to have grass vegetation maintained to 100mm under the array installation or mineral earth or non-combustible mulch such as stone.

6.3.2 Where practicable, solar energy installations can be sited on grazed paddocks. In this case, vegetation is to be managed as per the requirements of this guideline, or as informed through a risk management process.

7. Battery Installations

7.1 Siting of Battery Installations

7.1.1 Containers/infrastructure for battery installations are to be located so as to be directly accessible to emergency responders (e.g., provided with a suitable access road).

7.1.2 Adequate ventilation of the battery container/storage area is to be provided where required under (DR) Australian Standard 5139 Electrical Installations – Safety of battery systems for use with power conversion equipment; the manufacturer’s requirements and/or SDS for battery storage.

7.1.3 Containers/infrastructure for battery installations are to be provided with appropriate spill containment/bund ing that includes provision for fire water runoff.

7.2 Operation and Maintenance of Battery Installations

7.2.1 Battery installations that contain dangerous goods may have to comply with the requirements of the Dangerous Goods Act 1985; the Dangerous Goods (Storage and Handling) Regulations 2012; and relevant Australian Standards.

7.2.2 Battery storage manufacturers must provide specifications for safe operating conditions for temperature and the effects on battery storage if involved in fire. This information must be provided within the content of the emergency information book.

7.2.3 Battery installations are to be kept free of extraneous materials and combustible materials of all kinds. Regular inspections and housekeeping is to be conducted to ensure materials do not accumulate.

7.2.4 Battery installations are to be serviced/maintained as per the manufacturer’s requirements.

7.3 Fuel/Vegetation Management at Battery Installations

7.3.1 Containers/infrastructure for battery installations must be clear of vegetation for 10 metres on all sides, including grass. CFA requires non-combustible mulch such as stone or mineral earth within this 10-metre area.