

From: [Dennis Armstrong](#)
To: [Do-Not-Reply IPCN Submissions Mailbox](#)
Subject: Thunderbolt Wind Works request for submissions on additional information
Date: Wednesday, 10 April 2024 6:59:51 PM
Attachments: [Outlook-nqxgyyxi.png](#)
[Final SA-15-23 Incident response to industrial solar farm fires QLD .pdf](#)
[SOS extra comments on Thunderbolt WW 240410.pdf](#)

Dear Commission

Please find attached our additional submission on a matter raised by the Commission with the Department.

Please acknowledge receipt of our submission.

Regards

Dennis Armstrong

For Save Our Surroundings (SOS)



Save Our Surroundings (SOS) is part of network of like-minded groups of concerned & impacted citizens in rural Australia directly affected by the proliferation of industrial scale weather-dependent “unreliables” & their negative impacts upon local & global environments & communities. Independently run groups like SOS span multiple States. We share & distribute information, research & experiences with each other & other parties.

Safety Alert

Safety Alert No. SA-15-23

Effective Date: 21/11/2023
Version: 2.0

Incident response to Industrial Solar Farms Fires

Purpose

To advise all operational Rural Fire Service (RFS) and Fire and Rescue Service (FRS) staff and volunteers of the potential risks associated with responding to an incident at industrial solar farms and large scale Battery Energy Storage Systems (BESS) and the mandatory actions that must be taken to ensure health and safety.

Issues

There are currently about 43 operational Industrial Solar Farms located in [Queensland](#) with another 88 proposed or under construction. A number of these industrial solar farms are located in areas where RFS are the primary responder.

Significant incidents on large scale industrial solar farms include catastrophic inverter failures which can result in doors being blown off and fires external to the inverters.

When responding to incidents (i.e. fires, including bushfires and disaster recovery efforts etc) at solar farms, there are several factors contributing to electrical contact risks which must be kept in mind:

- There are various components at each stage of solar energy production which have potential to be live such as:
 - Inverters (converting direct current (DC) to alternating current (AC))
 - Switch boards
 - Electrical wiring and connection terminals
 - Battery energy storage systems (BESS)
- Solar electricity will still be produced at dangerous voltages in low light conditions
- Typically, DC voltages exceed 1000 Volts which presents a risk of arcing in fault conditions
- Electrical faults can result in electrical fires
- DC electrical faults may not be automatically isolated by protection systems and may continue to arc/burn until input power is switched off or burnt to open circuit
- Wiring is live/energised as soon as it is connected to the solar system
- DC arcing can be caused when disconnecting DC connectors whilst under load (to be undertaken by authorised person for the Solar Farm site).
- Insulation faults or contact with live circuits can cause a rapid release of energy resulting in electrical arcing
- Solar electricity production includes both DC and AC electrical currents.
- Multiple sources of electricity (eg high voltage electricity from the transmission or distribution network and the solar array that is absorbing light)

Electrical and other safety hazards associated with solar Photovoltaic (PV) systems include:

- PV array and PV modules being live (energised) as soon as they are exposed to light
- Power Conversion Equipment (PCE), e.g. inverters, having hazardous voltages once connected to the PV array
- wiring being live (energised) once connected
- the risk of electrical faults causing explosion, arcing and fires



- DC voltages and current sources of PV modules causing series arcing that may not be identified by automatic protection devices and so remain in place unless physical action to remove the fault occurs
- DC arcing caused by disconnection of DC connectors under load
- rapid energy release from energy storage (if used) if an insulation fault occurs or contact is made between live (energised) circuits, resulting in arc flash hazards
- toxic gases
- flammable gases
- hazardous chemicals.



(Photograph 1: Solar Farm example)



(Photograph 2: Fire damaged Inverter post fire event)

MANAGEMENT

Planning and Preparedness:

- Under the [Construction and Operation of Solar Farms Code of Practice 2019](#), Industrial Solar Farms will have an **Emergency Management Plan** to outline the procedures for access by emergency responders, evacuation of people on the site and site control measures during an incident. The emergency plan should also identify the hazards (e.g. electric shock, contact with hazardous substances, toxic gases) that may occur and how to safely manage those hazards during the emergency. It should also include information on safe remediation procedures or clean-up work after the emergency. RFS and FRS should engage with Solar Farms in their local area and obtain a copy of the Emergency Plan for station/brigade reference. RFS and FRS officers to ensure that they are aware of the contact details for the Solar Farm if unstaffed. The Code of Practice states that emergency contact details should be displayed at the site entrance.
- It is important to be aware of the level of acceptable loss that your local Solar Farm is willing to accept as this will impact the level of response required from QFES.

Response:

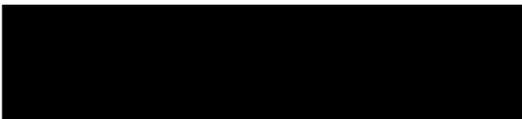
- Self Contained Breathing Apparatus (SCBA) **must** be worn when working around burning solar panels and BESS due to the highly toxic gases. Under no circumstances should an officer go into the smoke or approach a fire without the correct respiratory protection.
- As RFS do not carry SCBA, RFS officers must not undertake a direct attack of solar panels that are burning, or operations that require crews to work in smoke from burning solar panels. RFS officers will be restricted to fighting exposure fires where the Solar Farm is not burning.
- Isolation of electricity production on solar farms must only be undertaken by an authorised person for the Solar Farm site.
- QFES Staff and volunteers are **not to enter** the solar farm property until an appropriately qualified electricity representative from the Solar Farm is onsite and deems the area safe to enter, and safe to investigate smoke or undertake fire response activities.
- Do not put water on Solar Panels. Emergency responders are to treat all wiring and solar module components as though they are electrically energised.
- Bush Fire Air Operations should operate upwind from the smoke plume of Solar Farm Fires due to the toxicity of the gases and visibility for the aircraft. The aircraft will also attempt to avoid hitting solar panel arrays with firebombing loads due to possible damage to structures and panels.
- When fighting wildfires in the vicinity of a Solar Farm, officers will need to, as per doctrine, wear negative pressure masks with MPC canisters.

Post-Response:

- Responding crews to ensure that all PPC are laundered correctly due to the contaminants.

References

[Electrical Safety Act 2002](#)
[Electrical Safety Regulations 2013](#)
[Qld Work Health and Safety Act and Regulation 2011](#)
[How to manage work health and safety risks code of practice 2021](#)
[Construction and Operation of Solar Farms Code of Practice 2019](#)
[A Review on Safety Practices for Firefighters During Photovoltaic \(PV\) Fires Section 4.3.6](#)
[TacG-02-11-00-Hazardous-Materials-Large-Battery-Energy-Storage-Systems-Incidents.pdf \(sharepoint.com\)](#)
[TacG-02-07-00-Electricity-Supply-and-Distribution-Infrastructure.pdf \(sharepoint.com\)](#)
[Tactical Directive \(TacD\) 14.03.00 – Hazardous Material Incidents – Decontamination of QFES Staff and Volunteers and Members of the Community; \(sharepoint.com\)](#)



David Hermann AFSM GAICD
Assistant Commissioner, QFES People

Relevancy Matrix									
	Fire and Rescue		Emergency Management	Rural Fire Service		State Emergency Service		QFES Support	
	Full-time	Part-time	Full-time	Full-time	Volunteers	Full-time	Volunteers	Full-time	Part-time
Applicable:	✓	✓		✓	✓				
Not applicable:			X			X	X	X	X
Contact: Manager, Safety and Wellbeing 0477 985 925			Issue Date:	Removal Date:					
			21/11/2023						

IPCN request for submissions on additional information

Thunderbolt Wind Works: SSD-10807896

IPCN request for submissions on additional information

Save Our Surroundings (SOS) provides our comments on the Commission's request for further information from the Department of Planning, Housing and Infrastructure (Department) for the Thunderbolt Wind Works in particular, Question 2: Firefighting Operations..

SOS trust that the Commission will be very objective in assessing the known increased fire risks, whether in a declared bushfire risk area or undeclared grass/bush fire risk area. We believe our comments highlight the flaws in the Department's response.

Question 2: Firefighting Operations

d) The potential for the turbines to restrict aerial firefighting in the locality has been raised in multiple submissions to the Commission. Is the Department confident that the development will not restrict aerial firefighting in the locality?;

e) please clarify whether the proposed water tank capacity of 20,000L is sufficient for the firefighting needs of a wind farm development, including in times of drought and limited surface water access.

SOS Comments:

Section 2.4.2 of RFS's Planning for Bushfire Protection 2019 states "*Given the scale of SSI and SSD projects, the requirements of this document should still be applied, and seeking advice from the NSW RFS is encouraged*".

The above statement highlights the limitations of the RFS in addressing the unique **increased** fire risks that wind, solar and BESS projects pose to rural inhabitants and visitors, property, live stock and wildlife and crops. The RFS have no specific mitigation strategies for industrial wind, solar and BESS works because they have so little experience in fighting fires that involve such works. The renewable energy zones will concentrate such works so that the individual increased risks of each development will be cumulative. Many of the proposed works will actually adjoin the boundaries of other works.

It is beyond comprehension why the NSW RFS and their interstate equivalents will not publically declare that they will not directly fight a fire within a wind turbine works, a solar works or a BESS works because it is too dangerous to do so. The attachment (SA-15-23) demonstrates what fire fighters are actually told to do when confronted with a fire within a solar and/or works, whether started within the works or having entered the works externally. Similar safety advice applies to wind works.

Basically the emergency services protect the perimeter and let the components of the works burn themselves out. We have already had this approach applied to a recent wind turbine fire (Goulburn) and a solar works fire (Beryl) in NSW and BESS fires in Victoria and Queensland.

The Department has stated the usual response to the management of fire risks. The proposed measures, such as a 20,000 litre water tank, 10 metre APZ, vegetation management, and bush fire management plans, the aerial fire fighting assurances will not eliminate the INCREASED risks involved. Mitigation is not elimination of the substantial increased fire and toxic smoke risks.

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Country regional inhabitants fear grass and bush fires above all other dangers they face. They are frequent, occur any time of year and can quickly become devastating. The proposed standard response to fire mitigation fails to address any of the following:

- The Thunderbolt Works will INCREASE the risk of fires starting on the 5,918 hectare (59.2km²) site and spreading from within or from outside the site. The significantly INCREASED risk remains with the proposed mitigation proposals.
- Mitigation of chemically laden toxic smoke released from burning wind turbines, lithium batteries, inverters, electrical wiring and other components has not been addressed at all.
- Rural Fire Service personnel are volunteers who have jobs or run farms and businesses. Volunteer numbers have been falling just when the wind, solar, transmission lines and BESS projects are increasing across rural and bushland areas.
- Many RFS fire-fighters have died whilst fighting grass and bush fires, including at least two in 2023. It is a very high risk service they provide, not only to their own communities but across all regional communities and even overseas. The risk to them is INCREASED when they have to contain a fire occurring within a wind works, solar works or BESS. Toxic smoke INCREASES the risk over and well above the ash from a vegetation only fire.
- The RFS, FRNSW and HAZMAT services will not enter a burning industrial wind works site or BESS due to blade throw, electrocution risks, entrapment risks, explosion risks and chemically laden smoke risks. They will try to contain the perimeter but the sheer size of the works site makes this very much more difficult, if not impossible. Even the 310ha site at Beryl solar works posed access problems for ground crews. A fire in a 6,000ha site is an obvious risk yet to be faced by fire-fighters, but apparently ignored by the authorities.
- Aerial water bombing is not only more hazardous but, in just a major grass fire, such as the Leadville-Dunedoo fire of February 2017 burning 55,000ha in a day, virtually impossible when dense smoke rises hundreds of metres into the air so obscuring people, properties, and hazardous structures on the ground, such a wind towers, metrological masts and transmission lines and towers. In this case size matters!
- It takes considerable time for each RFS team to assemble when a fire emergency occurs as many of them will be located well away from their base. The distances to be travelled from towns, farms, businesses are measured in tens of kilometres. An out of control grass fire can spread very quickly under benign conditions let alone under adverse conditions at any time of the year. The Leadville-Dunedoo fire front travelled at 12kms an hour.
- If a BESS catches fire then RFS and FRNSW services have to tie up crews for days to contain the perimeter while the chemical reaction battery fire burns itself out. For the two BESS fires in Australia so far this took four days each. This EXTRA utilisation of fire-fighting resources puts other parts of the region at additional risk, especially when volunteer numbers are falling and funding is scarce.
- Special fire-fighting protection gear, such as additional breathing gear, is required to be near burning batteries and solar panels. Extra cost to the RFS and also space on fire trucks is already limited, so not all RFS volunteers will have access to such additional protective gear.

IPCN request for submissions on additional information

- RFS personnel are prohibited from publically speaking about how they respond to industrial solar, wind and BESS fires. The FSNSW was threatened to be sued by the owner/management of a recent solar works fire if they did not remove the photos from social media that they took of the fire. One of the FSNSW crew at the fire was also ordered to take down his personal photos of the fire, even though they were shot from outside of the burning site.
- While a different Council, the MWRC requires a land owner of 5 or more hectares to install a 20,000L water tank fitted with a 65mm storz fitting or reserve 20,000L of a larger tank for fire-fighting purposes. By the end of 2019, after three years of drought, virtually all water tanks and dams were dry. In late 2023, 75% of NSW was already drought affected and regional people were once again trucking in water to their properties for domestic use and for their livestock. A 20,000 litre tank water supply for a 5,918ha project site is clearly inadequate, no matter what the RFS or Department believe. Hundreds of thousands of litres of water were used just on the two BESS battery fires. Not to extinguish but to keep the other units cool.
- Three out of control grass/bush fires near Gulgong in just October 2023 reached Emergency Level. They took days to control. Strong daytime winds blew burning embers hundreds of metres ahead of the fire front, causing additional fires. Likewise, a fire that started in 2022 in a field across the road from a solar works and in benign conditions jumped the road and was extinguished just as it reached the solar works boundary. This was despite 15 emergency vehicles being present at the time and three water-bombing helicopters being used. This is the reality of our regional fires. "An APZ of minimum 10m would be maintained between all vegetation and infrastructure within the Development footprint." is meaningless when faced with the reality of an out of control grass fire.

Some examples of recent grass fires in a designated Renewable Energy Zone:

The Leadville-Dunedoo fire (Sir Ivan bushfire) of February 2017

[NSW coroner to inquire into 2017 Upper Hunter and Central West bushfire - ABC News](#)

55,000 hectares (550km²) of land burnt, 35 homes destroyed, 6,000 livestock killed and numerous injuries, farmland and wildlife habitat destroyed, untold wildlife killed and millions of dollars in damage done. All this in about 24 hours.



February 2017 Central West NSW Leadville-Dunedoo fire front



Why we hate grass fires

Beryl fire #1 July 2022

Essential Energy reported that 144 properties in the vicinity of Beryl Solar Works had lost power. An equipment fire at or near the solar works was reported. Most of the affected properties had no grid electricity for most of Sunday and over twenty properties still had no power well into Monday. The nature and cause of the equipment fire and power outage have not been publicly reported.

Beryl Fire #2 August 2022

[Water-bombers sent to out-of-control fire near Gulgong, as wet ground hampers RFS efforts - ABC News](#)

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A grass fire that started about midday across the road from Beryl Solar Works jumped across Beryl Road and into grassland adjacent to the Beryl Solar Works. A major fire emergency was declared with over a dozen fire-fighting and police units dispatched within a 30 km radius or more of Beryl. In addition, three water-bombing helicopters were called in and used to save buildings and stop the fires entering the solar works, as vehicles could not get close to the fires. The fires burnt for nearly four hours before being brought under control, which was notified at 3:41pm



Fire jumped road from left to right



Fire reached solar works fence



Multiple RFS units fight the fire

Beryl fire #3 September 2022

Grass fire on the site at Beryl of yet another proposed solar works within sight of Gulgong township. RFS allowed fire to burn itself out.



Grass fire starts about 12:20pm



Part of the aftermath

Beryl fire #4 April 2023

[Gulgong, NSW: Fire at Beryl Solar Farm | Sky News Australia](#)

On Monday 24 April 2023 at about 12:30pm a grass fire broke out. This was the worse of the recent fires that has occurred in or near the Beryl Solar Works, resulting in 18ha of damaged area under solar panels and a reported damage cost of \$7m. It burnt for about 4 hours. The several RFS, FRNSW and HAZMAT teams just protected the perimeter as they will not enter a burning solar works. A wind reversal extinguished the fire. Weather conditions were benign at the time. The cause of the fire was said to be an electrical cable fault under a solar array.



Smoke blankets nearby properties



Grass fire burns under the solar panels

IPCN request for submissions on additional information

Three emergency level fires between Gulgong and Mudgee in October 2023

Multiple fires around Gulgong, Ulan, Cope, Cooks Gap investigated by police, RFS amid fears they were deliberately lit.

[NSW fires around Gulgong, Ulan, Cope, Cooks Gap investigated by police, RFS amid fears they were deliberately lit - ABC News](#)

Home Rule and St Fillans properties at risk. More than 180 firefighters, over 50 fire trucks, two helicopters and a large RFS air tanker were used over several days.

[Authorities downgrade bushfire emergency warning in NSW's Central West - ABC News](#)



Some of the aftermath of the October 2023 fires along Henry Lawson Drive

IPCN request for submissions on additional information

The messages are is clear



Grass fires kill



Firefighters are "under funded" "under resourced" "under valued"

Conclusion

The proliferation of solar and wind works, including associated BESS, inverters, sub-stations, internal transmission lines and other infrastructure, as well as new high voltage transmission lines exposes landowners and towns people to **significantly increased** risks over and above the level of risks they already face. Concentrating such works in such a small area in declared renewable energy zones so close to towns invites a disaster at some point. Not if, but when! The precautionary principle must be applied.

Existing fire risk regulations and fire risk mitigation proposals are totally inadequate for solar and wind electricity generating works and BESS works and must be substantially improved before any more projects are approved so close to rural towns. SOS suggests for industrial solar, wind and storage projects that:

- No works be permitted within 15kms of any town to provide about an hour and half emergency response and evacuation time if the fire front is travelling at 12kms/hour
- Automatic sprinkler systems must be installed around the site or infrastructure perimeters and be operated automatically or remotely when necessary
- Several onsite dams full of water must be maintained onsite and safely accessible for water-bombing craft use
- Several easily accessible 50,000 litre water tanks must be located around the outside perimeter of the site and easily accessible by fire-fighting ground crews
- Works owners must contribute financially to all the local RFS and FSNSW units annually to help fund the specialised equipment and training required and for research into how to safely fight turbine, solar panel and battery fires.

We look forward to the Commission imposing effective fire-fighting conditions, if the project were to proceed, despite all the numerous other negatives that cumulatively dictate that the project should be rejected.

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Regards

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