ATA Response to WPI Findings on Rooftop DC Isolators

ATA understands that rooftop DC isolators were originally proposed by the emergency services industry as an additional point of isolation for DC current on solar photovoltaic (PV) systems. These are additional to DC isolation switches on the panel side of the inverter (as required under the AS/NZ 5033 Standard).

The Role of the DC Isolator

A rooftop DC isolator can shut off DC current in the DC cabling that runs along and inside the roof cavity, and down to the solar inverter.

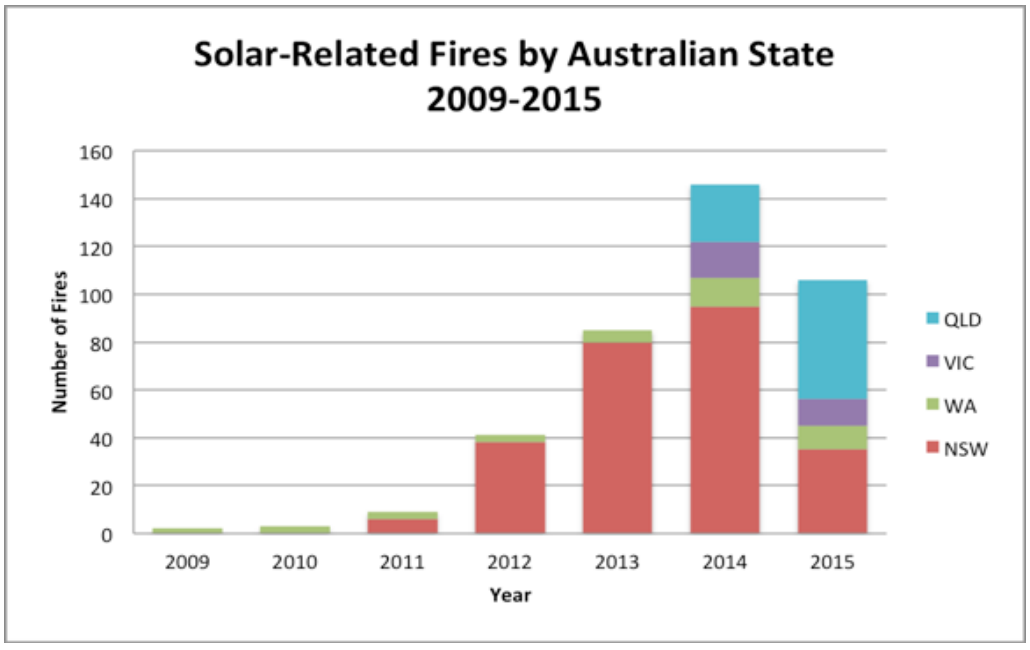
The rooftop DC isolator can only be operated by a person on the roof. This can improve safety for emergency service personnel in a building where cabling may have been damaged (for example, during a fire).

It should also be noted however, that even with a switched isolator, voltage remains present in the cabling under the panels and above the roof and is a safety risk to anyone coming into contact with the DC cabling.

Solar-Related Fires in Australia

Each year, approximately 1.5% of residential fires in Australia are caused by solar PV systems[1]. A significant increase in solar-related fires occurred between 2011/12 and 2015 – somewhat reducing from 2014, however still relatively high by historical comparison (**Figure 1**):

Figure 1: Solar-Related Fires in Australia from 2009-2015 (Data Source: AFAC)

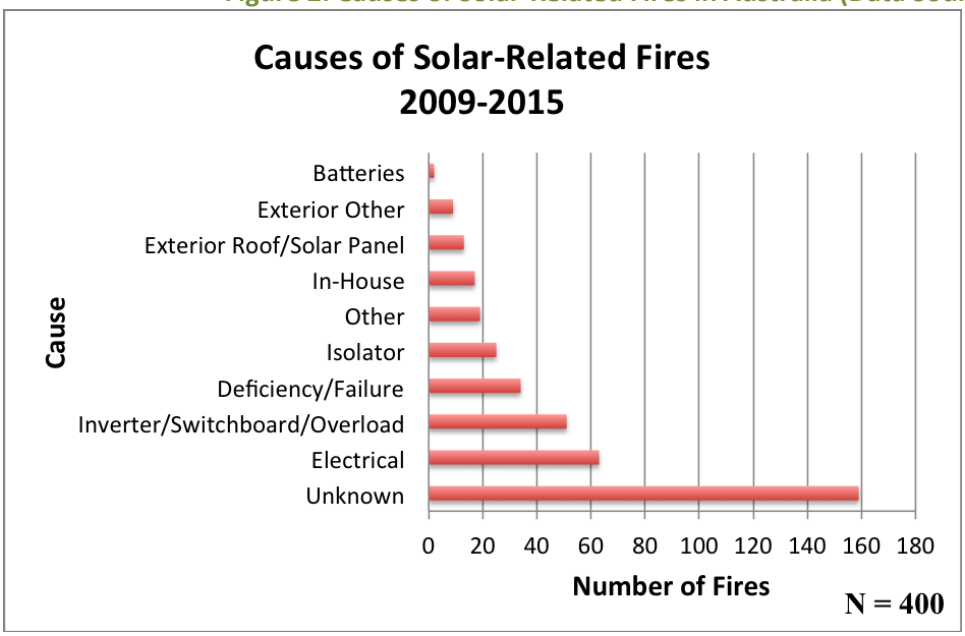


[1] Australasian Fire and Emergency Service Authorities Council (AFAC) data.

Out of the recorded solar-related fires nationally from 2009 to 2015[2], the highest known causative agent was determined to be an unspecified electrical component of the solar PV system (some of which may be associated with rooftop DC isolators).

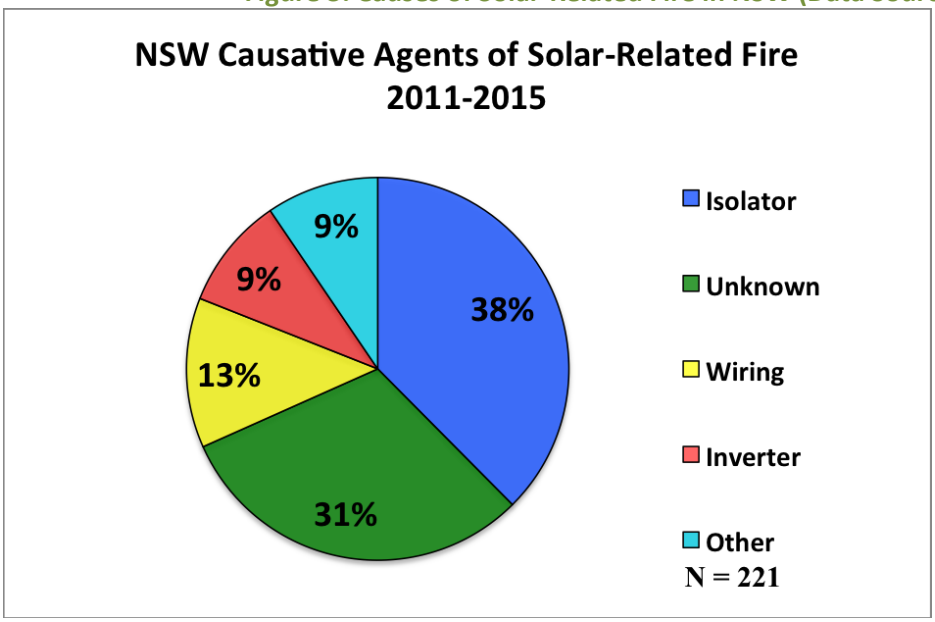
In addition, 19% of solar-related fires were caused specifically by an isolator, inverter, or switchboard malfunction (**Figure 2**):

Figure 2: Causes of Solar-Related Fires in Australia (Data Source: AFAC)



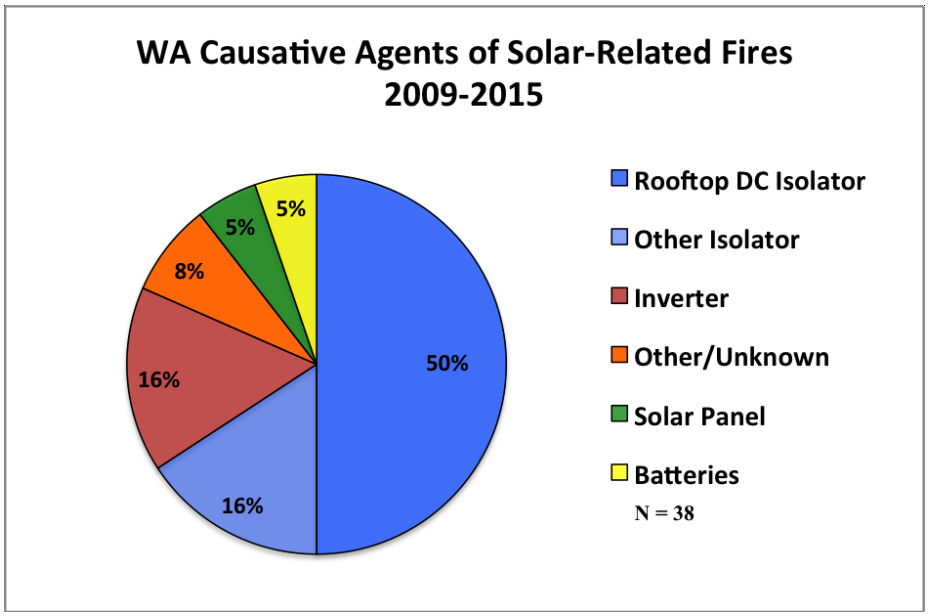
From 2009 to 2015, between 38% and 50% of recorded solar-related fires in WA[3] and NSW were caused by a DC isolator (**Figure 3**):

Figure 3: Causes of Solar-Related Fire in NSW (Data Source: FRNSW)



[2] Statistical data retrieved from the Australian Incident Reporting System database.
[3] WPI noted that further research was needed for WA due to its small sample size.

Figure 4: Causes of Solar-Related Fires in WA (Data Source: AFAC)



Finally, of the 209 solar-related fires in QD prior to 2015, 187 of these were attributed to failures of DC isolators[4].

As a result, in both 2012 and 2014, the Australian Competition and Consumer Commission (ACCC) issued recalls on several rooftop DC isolator products in the market at that time. Four out of five of these isolators were recalled due to faults that potentially led to an increased fire risk[5].

It is noted that the quality of rooftop DC isolators in the market has improved since these product recalls[6].

International Experience

Germany and the United States do not mandate the use of rooftop DC isolators:

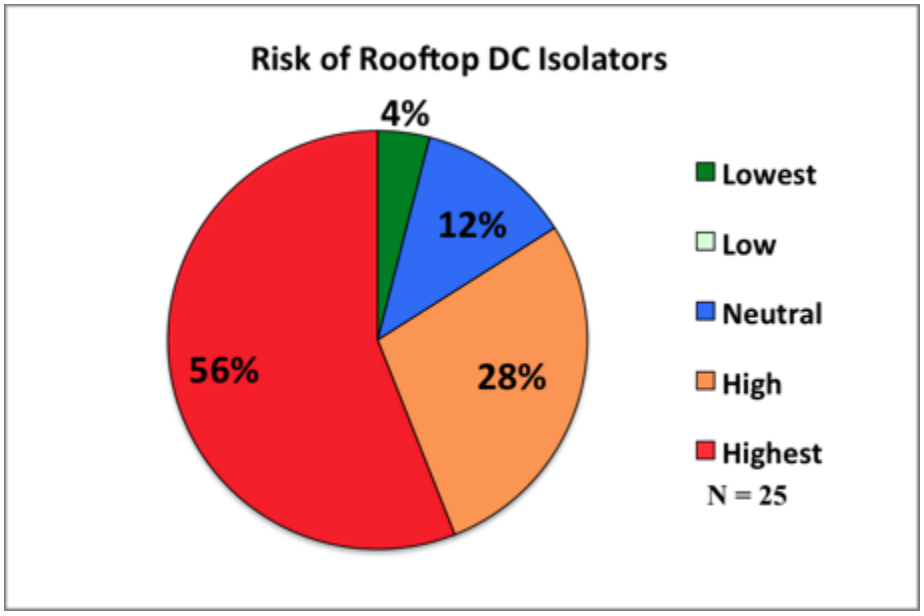
- Germany and other European countries require DC isolators to be built-in with the inverter[7]. This eliminates an extra connection in the solar PV system, resulting in fewer failure points;
- The US requires disconnect switches for isolation with any electrical equipment that is connected to a building's electrical circuitry[8]. These are installed at a readily accessible location on the outside of a building;
- There have been very few incidents of fires originating from solar PV systems.

[4] Holden, 2015
[5] ACCC, n.d.
[6] Manufacturers have increasingly used weather-shield casing to house the isolator, stopping water ingress.
[7] Projoy Electric, 2015
[8] Grant, 2013

The Solar Industry View

The WPI team received 25 survey responses from Australian-based solar installers. Sixty percent of these installers indicated that rooftop DC isolators are a primary cause of solar-related fires in Australia (**Figure 5**).

Figure 5: Risk of Rooftop DC Isolators – WPI Installer Survey Results[9]



In addition, the majority (84%) of these installers felt that rooftop DC isolators contribute added risk to solar systems. Factors such as harsh weather conditions lead to the breakdown of the system, which can increase the fire risk of the component.

More than half of the respondents identified water ingress as one of the leading problems with rooftop DC isolators. Infiltration of water into the component can cause circuit shorts and increased fire risks.

Fire Industry Use

ATA understands that the rooftop DC isolator was proposed largely for firefighters as a point of isolation of DC current from the solar panels to the inverter.

As part of the WPI team's investigations, documented standard operational procedures (SOPs) were obtained from four fire services in four different Australian states. From these SOPs, it was ascertained by WPI that:

- the rooftop DC isolator switch is not utilised by two fire services; and
- the other two fire services' SOPs stated that the rooftop DC isolator is utilised only as a last resort.

It is likely the case that few rooftop DC isolators on Australian solar PV systems have ever been used in any fire or other event.

[9] Data Source: WPI IQP Installer Survey.

ATA View

Taking into consideration the data and feedback sourced by WPI and presented above, ATA's view is that the removal of rooftop DC isolators from AS/NZ 5033 should be given serious consideration by Standards Australia.

This is on the basis that rooftop DC isolators:

- appear to be the primary cause of a significant number of solar-related fires in Australia over the past decade;
- are not actually used in practice by the fire services industry;
- appear to increase operational risk without providing material safety benefit;
- increase system cost and cause loss of solar generation when they fail; and
- are typically not mandated internationally.

As a result of this work, ATA will be engaging with the solar and fire industries more broadly over the coming months with a view to engaging with Standards Australia over the future role of rooftop DC isolators in the Australian solar industry.