

SDA - Lives at Risk?

1 Introduction

1.1 Summary

This paper looks at the issues associated with Clause 22.1 “Emergency power solutions” in the NDIS Specialist Disability Accommodation Design Guide¹ (SDA DG).

Section 1 introduces the background and provides an overview as well as summarising circumstances regarding three fatalities that have occurred in the past. Section 2 is a detailed discussion of related issues. Section 3 contains seven recommendations, and the Conclusion briefly touches on possible legal ramifications if changes are not made.

1.2 Three Fatalities

A newspaper report covered the death of a man “*believed to have been suffering from muscular dystrophy*” in December 2015 at Wayville²:

“ the man’s breathing machine shut off between 2.09am and 4.48am after balloons and streamers tangled in power lines caused an 11,000 volt line to short, blacking out about 500 homes near the Showgrounds.”

There is conflicting reports about the deaths of muscular dystrophy sufferers Conor Murphy and Kyle Scolari in Perth in 2014. The immediate cause was a power outage due to “*tornado downed power lines*”.

One report stated that “*the machine doesn’t have the backup supply*” and the failure of “*life preserving electronic breathing equipment*” could not be addressed because³ “*Their beeper turned off and unfortunately, they couldn’t rouse the carer*”.

According to another account ⁴ “*It has been reported that a backup generator at the men’s home failed*”. If this is the case, then one possible cause is that the changeover switch failed to operate when the mains power failed.

All three fatalities may have been preventable. Could they happen in an NDIS SDA home?

1.3 Background and Overview

This paper was prompted by a recent power outage at home. And it’s particularly informed by my experiences as a C3/C4 quadriplegic in poorly insulated rental accommodation in the middle of an Adelaide summer.

The subject for discussion is Clause 22.1 “Emergency power solutions” (Figure 1).

¹ NDIS Specialist Disability Accommodation Design Standard, Edition 1.1 Issue Date 25th October 2019

² <https://indaily.com.au/news/2015/12/16/inquiry-call-as-sa-man-on-life-support-dies-during-power-outage/>

³ <https://www.perthnow.com.au/news/wa/beaconsfield-housemates-and-muscular-dystrophy-sufferers-conor-murphy-and-kyle-scolari-die-after-storm-cuts-power-to-vital-medical-equipment-ng-757bf5048401ae0d63115258f4f1e571>

⁴ <https://www.abc.net.au/news/2014-07-15/brother-pays-tribute-to-man-who-died-in-perth-storm-after-power/5597012>

Is it fit for purpose?


22. Emergency power solutions			
Clause	Design Requirement	Rationale	Applicable to
22.1	Emergency power solutions shall be provided to cater for a minimum 2-hour outage in no less than 2 double GPOs in participant bedrooms and any provided automated doors that are used for entry or egress.	Backup for life support systems if needed by participants.	

Figure 1 - Specialist Disability Accommodation Design Standard⁵ Clause 22.1

A review from an engineering perspective indicates that Clause 22.1 need to be reconsidered for the following reasons:

1. it's a questionable duration requirement,
2. there are no power or capacity requirements,
3. the requirement fails to take into account additional concerns relating to a power outage,
4. there is no definition of "life-support systems" "if needed" by participants,
5. missing a definition of applicable standards & requirements,
6. fails to address the correct operating characteristics of assistive technology during a power outage,
7. there may be a range of NDIS participants needing this solution apart from just one category,
8. there is no guidance regarding the approval of alternatives, and
9. the SDA DG is missing any references to integrating the emergency power backup into the wider Smart Home/home automation integrated system.

2 Discussion

2.1 Duration Requirement

In the case of the 2015 fatality, the power outage was more than two hours. And the two people in Perth were on the receiving end of a power failure during a storm - an outage which potentially could have taken hours to fix.

All three fatalities *appear* related to an outage duration more than two hours,

There is no assurance an outage can be restricted to 2 hours or less to suit the SDA DG two-hour time limit. Other possible power outage causes include⁶ :

- "severe weather such as damaging winds, lightning or extreme heat,

⁵ Ibid

⁶ <https://www.sapowernetworks.com.au/outages/what-to-do-when-the-power-goes-out/>

- *birds, possums, or other animals on the lines,*
- *motor vehicle incidents,*
- *essential maintenance on the network to ensure the safety of our crews,*
- *excavation of underground cables,*
- *load shedding if directed by the Australian Energy Market Operator.”*

Clearly, the two-hour SDA requirement is inadequate.

2.2 Vague Equipment Definition & Tailoring to the Individual

What is being backed up in accordance with the SDA clause 22?

The Australian Energy Regulator has a list⁷:

- *an oxygen concentrator*
- *an intermittent peritoneal dialysis machine*
- *a kidney dialysis machine*
- *a chronic positive airways pressure respirator*
- *crigler najjar syndrome phototherapy equipment*
- *a ventilator for life support*
- *in relation to a particular customer—any other equipment that a registered medical practitioner certifies is required for a person residing at the customer’s premises for life-support*

In addition to the above list, there is an “other” category as defined in . Clearly, the emergency backup supply needs to be tailored to individual users.

A generic universal “emergency supply” of sufficient capacity to address a worst-case situation - such as air-conditioners - is going to be an unwarranted extra cost if required for all homes in a particular SDA category.

Importantly, the definition of life support equipment includes a category for ‘other’, being any equipment that a medical practitioner considers is essential for their patient. ‘Other’ life support equipment may include, but is not limited to, the following:

- | | |
|--|--|
| • external heart pumps | • hot water |
| • respirators (Iron lung) | • nebulizer, humidifiers or vaporizers |
| • suction pumps (respiratory or gastric) | • apnoea monitors |
| • feeding pumps (kangaroo pump, or total parenteral nutrition) | • medically required heating or air conditioning |
| • insulin pumps | • medically required refrigeration |
| • airbed vibrator | • powered wheelchair |

Figure 2 - "Other" life-support equipment

⁷ <https://www.aer.gov.au/retail-markets/compliance-reporting/aer-life-support-registration-guide-2021>

2.3 Inadequate Definition Of Applicable Standards & Requirements

I am not familiar with the Australian equipment requirements, but given the potentially lethal consequences of getting it wrong, I suspect something along the lines of *"IEC 60601-1-11:2015+AMD1:2020 CSV Medical electrical equipment - Part 1-11: General requirements for basic safety and essential performance - Collateral Standard: Requirements for medical electrical equipment and medical electrical systems used in the home healthcare environment"* would be applicable.

Anyone out who works in this area or has knowledge of /access to the applicable Australian Standard and can clarify this please assist?

2.4 Failure To Take Into Account Additional Considerations During A Power Outage

A power outage doesn't just affect essential items of equipment plugged in next to the bed. The circumstances leading to the power outage and any other systems affected need to be considered.

Although aimed at residential care facility, Appendix H "Heatwave and Health and Safety Risks" *"outlines some of the research which confirmed the risk to customers during outages"* including the following⁸:

1. communication items such as Internet or landline,
2. environmental controls including air-conditioning and heating,
3. Storage of food and medications,
4. Security & control including electronic door locks, alarms, fire panels and computer-based equipment,
5. Water if relying on a pressure pump or heat pump for temperature control

And this is a real practical concern. Power outages due to bush fires or heat wave rolling blackouts constitute a genuine risk with a potentially long duration. Which means you also need to consider maintenance of a safe environment including heating and cooling for an extended period.

2.5 Behaviour Of Assistive Technology During A Power Outage

As explained in Section 1.2, two fatalities occurred despite 24 hours on site assistance. The problem was that the power outage also caused a failure of the alarm system.

It is possible that basic commissioning tests - such as verifying correct system operation in the event of Internet or power outage - had not been carried out. But this is speculation. There are a variety of potential causes including lack of maintenance, item failure, or simply not operating in accordance with manufacturers instructions.

⁸ "Guidance for the Selection of Generators for Aged Care Homes" Published by Torrens Resilience Institute (Flinders University and Resthaven). 2017 Slightly different context, but just as applicable.

2.6 Mandatory Notification Requirements

Not directly relevant here, but it may be appropriate to point out that there are legal requirements associated with notifying the energy provider that life support equipment is on-site⁹.

2.7 Failure To Consider Alternatives

Any serious discussion regarding residential backup power has to include so-called solar batteries. These can be programmed to maintain certain minimum charge and may be an ideal backup source. The last decade or so has seen widespread adoption of a range of technologies and, most importantly, significant changes in the regulatory environment. Unfortunately factors such as COVID and supply chain problems over the last two years have resulted in the cost of some solar batteries going up rather than down.

Current leading-edge technology is to integrate home energy batteries, electric vehicles with Vehicle to Grid (V2G) capability and solar panels. These have the potential to provide continuous backup energy over a period of days or weeks if necessary.

One estimate of the inverter based DER technology expected over the next 10-20 years is:¹⁰

“...the following level of nameplate capacity to each residential premises:

- *5-8 kW of solar PV,*
- *15-22.5 kW of Level 2 EV charging, and;*
- *5-10 kW of battery storage.”*

The following section illustrates the dramatic changes currently underway.

2.8 Lack Of Forward Planning

The SDA five year pricing review takes into account a series of factors including depreciation, price of land et cetera et cetera et cetera. Stated upfront assumption is a lifespan of 20 years - with the property either being refurbished or having life extensions to meet that timeframe.

However, it appears that the NDIS SDA development process is negligent in that it fails to acknowledge, let alone account for the effect of climate change and the changeover to renewable energy.

Clause 22.1 indicates that SDA developers are not even looking five years into the future let alone 10 or 20 years. To give a few examples of the significant changes taking place:

1. In 2020 an NDIS SDA provider paired with an installer to equip eligible SDA homes in Salisbury, South Australia with both solar panels and solar battery¹¹: *“Natural Solar has also developed custom functionality for these tenants with each battery retaining a minimum of 20% charge at all times. In the event of a blackout or power outage, backup power will be activated, whereby the resident can prioritise household appliances to continue to run in order to avoid disruption.”*

⁹ <https://www.aer.gov.au/retail-markets/compliance-reporting/aer-life-support-registration-guide-2021>

¹⁰ Energeia "Distributed Energy Resources Enablement Project – Discussion and Options Paper" (Energeia-1.pdf) Revision 0.9 dated 22 May 2020 (page 21) - Prepared for Renew

¹¹ <https://inhousing.org.au/news-resources/news/our-salisbury-solar-battery-project-natural-solar>

2. The Australia National Electricity Market (NEM) set a new record of 68.7% renewable energy on Friday 28th of October 2022 - with rooftop solar *“producing more than all fossil fuel generation combined”*¹².
3. a recent trial (04 November 2022) was conducted in the Western Australian region where the coal fired power station was shutdown and¹³ *“Western Australia’s largest virtual power plant, taking in 300 customers and 650 behind-the-meter energy generation and storage assets, [went] live on the state’s main grid. The \$35.5 million trial, called Project Symphony, aims to “orchestrate” customer resources ranging from rooftop solar and battery storage to hot water systems and electric vehicles”*
4. in 2021 the Energy Security board (ESB) commenced a review of the impact of consumer solar panels, batteries and EVs¹⁴ (new word for the day: Distributed Energy Resources (DER)), while the Australian Energy Market Commission (AEMC) is currently reviewing the electricity consumer regulatory environment¹⁵.

Change is happening. Deal with it.

In other words, the failure to make provision in SDA for the installation, integration, and management of Electric Vehicle (EV) charging, solar battery, and solar panels during design and construction as part of a Smart Home/home automation integrated system is likely to be a very expensive mistake.

It’s also a missed opportunity to provide a long duration, reliable and flexible emergency backup supply. *Especially* in bushfire prone areas such as parts of country Western Australia.

¹² <https://reneweconomy.com.au/renewables-reach-record-68-7-per-cent-share-of-grid-power-in-australias-main-grid/>

¹³ <https://reneweconomy.com.au/wa-orchestrates-hundreds-of-home-solar-and-storage-assets-as-coal-shortage-continues/>

¹⁴ <https://esb-post2025-market-design.aemc.gov.au/integration-of-distributed-energy-resources-der-and-flexible-demand#delivering-the-cer-implementation-plan>

¹⁵ <https://www.aemc.gov.au/market-reviews-advice/review-consumer-energy-resources-technical-standards>

3 Recommendations

At the very least the following need to be considered:

1. **Professional Review** - SDA DG clause 22.1 review by appropriately qualified engineer to ascertain exactly what the appropriate requirements are for a minimum standard SDA Life Support emergency power supply. Groups associated with Engineers Australia such as Rehabilitation Engineering¹⁶ or the wider Biomedical College community¹⁷ can aid here.
2. **Wider Community Discussion** - More general review deciding if there is a need for inclusion of this clause in a minimum mandatory specification. Should there just be specific requirements for those situation where installation is essential? This leads onto a discussion about the lack of tailoring in the SDA DG to suit individual cases. Needs to be greater transparency regarding SDA DG revisions and updates, responsibilities, and process definition and milestones.
3. **Items Requiring Backup** - What additional considerations need to be taken into account when considering SDA DG backup power supplies? Again, this is where the wider community needs to be involved. My list includes NBN and Internet connections, computer networking equipment, UPS for computers, appropriate backup supply for AT including remote door operation, windows, and any voice operated hardware around the place. And this is just the start.
4. **Design, Commissioning, and Certification** - Self-evident that the design, commissioning, and certification of emergency power supplies needs to be done by appropriate professionals. NDIA needs to address this issue as a matter of urgency.
5. **SDA's Certification Qualification** - NDIA should review whether a Certificate IV in Access Consulting is a suitable qualification, given the skills, qualifications, and experience required for the professional design, review, and certification of life support emergency backup power solutions.
6. **Emergency Backup Power Certification Training** - NDIA to review the appropriateness of the Access Institute providing certification training to SDA reviewers and certifiers regarding life support emergency backup power solutions.
7. **Implement SDA Solutions Tailored to the Individual** - The SDA process needs to be changed from a dumbed down "cookie-cutter" standardised building approach, to an individual design tailored for specific circumstances. Especially where medical conditions make it a requirement to maintain 24/7 power to breathing equipment and heating/cooling systems for particular NDIS SDA participants.

¹⁶ <https://www.engineersaustralia.org.au/engineering-communities/colleges-and-college-national-committees/biomedical-college/national>

¹⁷ <https://www.engineersaustralia.org.au/engineering-communities/colleges-and-college-national-committees/biomedical-college>

4 Conclusions & Way Ahead

Clearly, the existing clause 22.1 is not fit for purpose . Needs to be updated ASAP. And the process which led to the current inappropriate clause needs to be reviewed.

In the event of a failure of an “emergency power solution” in an SDA registered home leading to a fatality, I suspect the coroner would want to have a chat to the Access Consultant who reviewed and certified the SDA registered home as suitable. The NDIA needs to change the SDA process and training to ensure this situation doesn’t happen.

Happy to receive any comments or contributions given the potentially fatal consequences of not getting it right.

(Signed)

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7 November 2022