The definite health risks from cutting power outweigh possible bushfire prevention benefits

Cutting off power during periods of high fire danger would lead to more deaths and higher costs to communities

Richard A Broome
MA, MB BS, MSc, Medical Adviser, Environmental Health[1]

Wayne T Smith
MPH, FAFPHM, PhD, Director,[1] and Conjoint Professor of Epidemiology[2]

1 Environmental Health Branch, NSW Ministry of Health, Sydney, NSW.
2 Centre for Clinical Epidemiology and Biostatistics, University of Newcastle, Newcastle, NSW.

rbroo@doh.health.nsw.gov.au

doi: 10.5694/mja12.10218

On 2 January 2012, during a period of extremely hot weather, a South Australian electricity distributor deliberately cut power to several thousand homes because it was concerned that its electricity assets might cause a bushfire. Its action raises an important question: when does the risk of electricity assets causing a bushfire outweigh the benefits of having a power supply?

The 2009 Victorian Bushfires Royal Commission heard that about 1%–4% of all bushfires are caused by electrical faults and that this proportion rises on days when catastrophic fires have occurred.[1] Switching off the power supply will, therefore, prevent a small proportion of fires. On the other hand, a functioning power supply has many health and safety benefits that may be particularly important on days of high fire danger.

In 2009, the California Public Utilities Commission (CPUC) rejected an application by the San Diego Gas & Electric Company (SDG&E) to shut off power during periods of high fire danger.[2] The CPUC stated that the SDG&E had "not met its burden to demonstrate that the benefits of shutting off power outweigh the significant costs, burdens, and risks that would be imposed on customers and communities in the areas where power is shut off". The commission was presented with a range of public safety issues that might arise from loss of power during periods of high fire danger. These included:

- failure of telephone, radio and television communications, vital not only in the early detection of fires, but also as a means of providing people with essential information during emergencies and evacuations;
- failure of electric garage doors, potentially trapping people in their homes;
- failure of traffic signals, increasing the risk of road accidents and potentially diverting police from more important duties;
- disruption to water distribution systems, potentially hampering fire fighting efforts and interfering with drinking water supplies; and
- the need to evacuate people reliant on home life support systems or with other disabilities.

Further, cutting power may create many new ignition sources as affected customers turn to alternative means of lighting and cooking, such as candles, barbecues and camping stoves. It should be noted that the CPUC's determination took into account an offer by the SDG&E to undertake a range of costly measures to mitigate the risks associated with a power shutdown.

> "the odds of dying during a heatwave are around 77% lower among people with a working air conditioner at home"

The issue of cutting power to prevent bushfires has also been considered by the Powerline Bushfire Safety Taskforce (PBST),[3] a taskforce established in response to the findings of the 2009 Victorian Bushfires Royal Commission. The PBST concluded that:

> Under most circumstances, the potential impact on the community that may result from the deliberate turning off of powerlines on a temporary basis outweighs the risk of leaving them in service. There will only be limited circumstances where deliberate turning off of powerlines on a temporary basis is warranted on a "lowest overall risk" basis. However, this precaution may be "reasonable and practicable" in those limited circumstances.

In coming to this conclusion, the taskforce estimated that leaving customers without power for 8 hours would have incurred a cost of $360 million. It is not clear whether this figure accounted for health and public safety costs, so it may be a substantial underestimate of the true cost of power failure.

A recent assessment of the health consequences of a power outage in New York found a 122% increase in the risk of death from accidents, and significant increases in other risks of death, independent of ambient temperature.[4] This evidence supports the substantial health risk directly attributable to power outages.

An important omission from the health and safety arguments presented by the CPUC and the PBST is a discussion of the role of air conditioning in preventing heat-related illness. Days of high fire danger are generally very hot and therefore likely to be associated with high rates of heat-related morbidity and mortality. For example, the Victorian government estimated that the 7-day heatwave preceding the February 2009 bushfires caused 374 deaths, a 62% increase above the baseline mortality rate.[5]

According to 2011 figures, 73% of Australian households use either a refrigerated air conditioner or an evaporative cooler, with the highest proportion (91%) in South Australia.[6] These active forms of cooling are a highly effective means of preventing heat-related illness. A meta-analysis of six case–control studies found that the odds of dying during a heatwave are around 77% lower among people with a working air conditioner at home (odds ratio [OR], 0.23; 95% CI, 0.1–0.6).[7] Given the prevalence of household air conditioning in Australia, cutting power would increase the risk of dying from heat-related illness by about 50%. Those without air conditioning at home are also at increased risk during power cuts because visiting an air-conditioned place is highly protective (OR, 0.34; 95% CI, 0.2–0.5), and having a working fan offers some protection, although this is not statistically significant (OR, 0.6; 95% CI, 0.4–1.1).[7]

Neither of these options is available to people living in a community without power, so our estimate of a 50% increase in risk is conservative. Home air conditioning is likely to be particularly important for the elderly and people living in remote and rural communities, whose ability to access other air-conditioned spaces may be limited.

The estimate of the protective effect of home air conditioning may be applied to the 2009 Victorian heatwave. If we assume that power was cut for the full 7 days, accounting for the fact that many residents were without power because of load shedding for up to 2 hours on 29–30 January 2009,[8] there would have been an additional 192 heat-related deaths. While this is an extreme example, it serves to illustrate the point that cutting power during a heatwave can have enormous consequences. If, as is more likely, power was cut for just a single day, there would have been an additional 28 deaths. Similarly alarming figures are found when examining a heatwave that affected Sydney in 2011. Again, as an extreme example, if power was unavailable for the duration of the heatwave, the deaths attributable to the hot weather would have increased by 50, from 96 deaths[9] to 146.

Deaths from heat outweigh direct deaths from catastrophic bushfires, with Australia's most catastrophic bushfire tolls (Black Saturday in 2009 and Ash Wednesday in 1983) resulting in 173 and 75 deaths, respectively. So from a public health perspective, power cuts are more likely to lead to adverse health outcomes than maintaining power on potentially catastrophic bushfire days. A crude method of assessing the excess potential cost is estimating the economic cost of deaths. If we assume that the average number of life-years lost for each death resulting from heatwaves is only 15 (as many of the attributable deaths are among older people), this would have resulted in a cost of about $356 million for the potential excess loss of life if no power had been available during the Victorian heatwave. Note that this figure does not include any other associated costs from power cuts, such as those of evacuating residents who are reliant on medical equipment at home, the costs to business and productivity, or those from transport cuts — it only considers the direct costs from mortality. This figure is calculated using the Office of Best Practice Regulation 2007 value of a statistical life-year,[10] discounted by 3% per year to account for years of life lost in the future. These costs will be incurred every time power is cut during heatwave conditions, but the probability of a catastrophic bushfire on any given heatwave day being attributable to electrical faults is very low. Hence, even if considered using a pure economic metric, a decision to voluntarily cut power supply appears highly unlikely to be justified.

> "it is our view that power should never be deliberately cut off, except to an area that has already been evacuated"

Clearly this additional risk from loss of air-conditioning protection during power cuts should be added to the other public safety arguments presented by the CPUC, and supported by the recent analysis of blackouts in New York.[4] When this is done, it is our view that power should never be deliberately cut off, except to an area that has already been evacuated. Certainly, the range of issues and risks involved in cutting power mean that the decision should never be taken by the electricity company alone. Systems should be in place for all relevant stakeholders, including health departments, to have input. These issues should be considered as part of the preparation phase of the emergency management cycle, as it is unlikely that there will be sufficient time to adequately calculate the health and other consequences during an emergency event.

Competing interests: No relevant disclosures.

Provenance: Not commissioned; externally peer reviewed.

1 Victorian Bushfires Royal Commission. 2009 Victorian Bushfires Royal Commission Final Report. Volume II: Fire preparation, response and recovery. Melbourne: Parliament of Victoria, 2010. http://www.royalcommission.vic.gov.au/Commission-Reports/Final-Report (accessed Apr 2012).
2 California Public Utilities Commission. Decision denying without prejudice San Diego Gas & Electric Company's application to shut off power during periods of high fire danger. San Francisco: CPUC, 2009. http://docs.cpuc.ca.gov/published/FINAL_DECISION/107143.htm (accessed Jan 2012).
3 Powerline Bushfire Safety Taskforce. Final Report. Melbourne: Energy Safe Victoria, 2011. http://www.esv.vic.gov.au/Portals/0/About%20ESV/Files/RoyalCommission/PBST%20final%20report%20.pdf (accessed Jan 2012).
4 Anderson GB, Bell ML. Lights out: impact of the August 2003 power outage on mortality in New York, NY. *Epidemiology* 2012; 23: 189-193.
5 Victorian Government Department of Human Services. January 2009 heatwave in Victoria: an assessment of health impacts. Melbourne: Victorian Government Department of Human Services, 2009. http://www.health.vic.gov.au/chiefhealthofficer/downloads/heat_impact_rpt.pdf (accessed Apr 2012).
6 Australian Bureau of Statistics. Environmental issues: energy use and conservation, Mar 2011. Canberra: ABS, 2011. (ABS Cat. No. 4602.0.55.001.) http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/4602.0.55.001Main+Features5Mar+2011 (accessed Jul 2012).
7 Bouchama A, Dehbi M, Mohamed G, et al. Prognostic factors in heat wave related deaths: a meta-analysis. *Arch Intern Med* 2007; 167: 2170-2176.
8 Reeves J, Foelz C, Grace P, et al. Impacts and adaptation response of infrastructure and communities to heatwaves: the southern Australian experience of 2009. Report for the National Climate Change Adaptation Research Facility. Gold Coast: National Climate Change Adaptation Research Facility, 2010. http://www.isr.qut.edu.au/downloads/heatwave_case_study_2010_isr.pdf (accessed Apr 2012).
9 Schaffer A, Muscatello D, Broome R, et al. Emergency department visits, ambulance calls, and mortality associated with an exceptional heat wave in Sydney, Australia, 2011: a time-series analysis. *Environ Health* 2012; 11: 3.
10 Office of Best Practice Regulation. Best practice regulation guidance note: value of statistical life. Canberra: OBPR, 2008. http://www.finance.gov.au/obpr/docs/ValuingStatisticalLife.pdf (accessed Jul 2012).