

Public Safety Power Shutoffs

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July 2019

1. Introduction

I've written on this subject before, but I'm not planning on putting any links to these posts below, as I hope to cover the whole subject in this one.

Climate change is increasing the occurrence of conditions that lead to out-of-control wildfires. Any ignition source in wildlands with an abundance of dry brush guarantees a wildfire. Major utilities understand this and have started to resort to the title of this paper, especially when the conditions are critical and an ignition source could result in a large out-of-control wildfire, and especially near communities.

In California we have had more than our share of these wildfires, so these shutoffs have already started, in spite of a very wet spring. While the conditions are not critical yet, we had a major heat wave about a month ago which dried out grasslands leading to a few grass fires. Although dry grass fires are much easier to control than dry brush fires, later in the season when the bushland starts drying out, a grass fire can provide the primer for a much larger brush fire. When a brush fire occurs during our dry high-wind events, it is very difficult to impossible to fight these until the dry high winds subside.

We normally get very little if any rain during summer in much of California, so the above described conditions are inevitable. Also inevitable are several major hot, dry wind-storms (out of the north) which make any brush fires uncontrollable. In late August to early October the bushland is dry enough to support these and they are expected. Thus when CalFire says to evacuate, we tend to do it (quickly).

This paper is not about the wildfires, but rather where the public safety power shutoffs are likely to occur, and reasonable steps residents of these areas can take to prepare for them. Hereafter we will call these events safety shutoffs.

2. Where

Many that read my posts know that I have two homes. Primary is in Livermore, California (Eastern SF Bay Area), and the other one is in the Sierra Nevada Mountains, about a two hour drive to the east from Livermore. The good news is most of the area immediately around Livermore is not in a high fire threat area. The bad news is that my home in the mountains (Arnold, in Calaveras County) is in an extreme threat (tier three) area. Go through the link below for the California PUC fire threat map.

<https://ia.cpuc.ca.gov/firemap/>

PG&E visited Calaveras County for meetings a few days ago (as of 6/19 when I'm starting this paper) to brief everyone, and our local newspaper reported on this. Go through the link at the end of this paragraph to see this article.¹

¹ Davis Harper, Calaveras Enterprise. June 6, 2019,
http://www.calaverasenterprise.com/news/article_664a1fc2-8877-11e9-a530-1bbc9b9a8162.html

PG&E has been very busy around my mountain home in early 2019, with extensive tree-trimming, deploying monitoring stations and upgrading their grid. However, given the information in the above referenced article, I believe we are likely to see several safety shutoffs, especially starting in late summer until we get serious fall rain (typically late October or early November).

Once the conditions are critical enough to cause a safety shutoff, when the conditions moderate the utilities cannot just turn the power back on. They must inspect all of the deactivated lines and substations, to make sure no damage occurred during the critical conditions that would become an ignition source as soon as the power is restored. When they restore power, they must make sure there are enough linemen available to quickly inspect any circuit that trips out due to a fault. They should also coordinate with CalFire and other firefighting units. This frequently means restoring the shutoff part of the grid in stages. All of this takes time and resources, so a safety shutoff is not something a utility does casually.

3. Preparation

Around Arnold we have outages year round. From the prior section you know about the summer and fall outages. In the winter to spring we have enough serious snow storms to cause outages. Sometimes outages last several days. Thus I have outage-proofed my home. I keep very little perishable food in my refrigerator, lots of emergency lighting, and an iron wood-fired stove to cook and heat in the winter. However only weekenders like me can do this. For full-time residents and (especially) business owners, they must make more thorough preparations.

Many battery energy storage system (BESS) vendors promote their solution as a perfect fit for this challenge. For most, I beg to differ. Early adapters will probably be interested in products like Tesla Powerwall², LG Chem RESU³, or other BESS designed specifically for residential applications.

For full-time residences, a small 1 to 3 kW portable generator (Honda is my preferred brand, \$1K to \$2K) plus a 5-gallon jerry-can of gasoline and plenty of extension cords will probably work. Ditto for small businesses, perhaps with a larger generator and more gasoline. I would guess that the largest business in Arnold (a small supermarket) probably would need a permanently installed 20-40 kW propane-fueled Generac or equal generator, a large propane tank, a supply contract from our local propane dealer, probably some rewiring to segregate and control critical loads and an outage disconnect. This would probably cost \$30K to \$50K. This approach might also work for residences or small businesses that don't want to mess with generators and gasoline, especially if they already have propane (cost would probably be \$10K to \$15K).

A residential-sized battery system without PV might cost \$15k to \$20k (installed), and would have a duration problem (Oops, still need a generator). PV has an issue in Arnold as we are in the forest, and shading is almost always a problem for residences. PV would probably work for the few larger businesses, but PV plus storage would probably be more expensive than the Generac, etc. Given our expensive power pricing, there will probably be a reasonable payback from the BESS plus PV for ongoing supply and backup, vs. the Generac system.

² Tesla, "Powerwall, <https://www.tesla.com/powerwall>

³ LG Chem ESS Battery Division, RESU, <https://www.lgesspartner.com/front/normal/en/main/main.dev>

Note that I'm not offering the above as a solution for climate change, just a fix for a temporary situation. Assuming our weather pattern change continues (likely), and the wildfire risk continues to be high (ditto), it is likely that the PUC will dictate undergrounding all transmission lines, distribution circuits and apparatus. Substations will require extensive vegetation clearance/management and perhaps more robust fencing. Local authorities should aggressively enforce restrictions against other potential ignition sources / activities. State and local authorities should boost rapid-response firefighting infrastructure. Vegetation fuel-management around communities in the wildland fire-prone areas should continue to be aggressively pursued.