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OVERSIGHT HEARING

Electric Utility Power Shutoffs: Identifying Lessons Learned and Actions to Protect Californians

BACKGROUND

In the months of September and October 2019, with forecasts of high winds in multiple parts of the state, millions of Californians were left in the dark as the state's three largest electric utilities proactively shutoff power to multiple circuits. The electric utilities deployed power shutoffs as a proactive strategy to reduce the risk of igniting wildfires from electric utility infrastructure under the anticipated high winds. After two consecutive years with multiple catastrophic wildfires, including some of the most catastrophic caused by electric utility infrastructure (Camp Fire, Thomas Fire, North Bay Fires, and others), electric utilities were now actively shutting off power in order to prevent additional fires. While the duration and frequency of the power shutoff events varied by, and within, each utility service territory, in many of the circumstances the power was off for multiple days, in some cases over a week at a time. The power shutoffs affected areas in a majority of the state's counties and resulted in numerous school closures, traffic signals not operating, the loss of phone and internet service for many, closed businesses and losses in product inventory, lost wages for workers, increase in patients seeking power for their medical devices at hospitals and other clinics, challenges for those unable to be transported to a location to charge their medical devices, and many other impacts where the use of electricity was no longer available.

This hearing will provide Senators and the public the opportunity to hear from each of the three electric utilities, relevant state agencies, affected residents, service providers and critical facilities, among others, about what exactly happened with the power shutoffs in late September and October, how many customers were affected and for how long, what worked and didn't work in the process of planning, notifying, shutting off power, and then restoring power. In short, this hearing is about understanding what lessons have been learned and what areas merit additional attention to ensure the negative impacts of power shutoffs are prevented in the near-term, and efforts are furthered and advanced to reduce, if not completely eliminate, the use of power shutoffs.

About electric utility power shutoffs. Although electric utilities do shutoff power to circuits in response to an accident, disaster or incident, such as a traffic accident or localized flood, those incidents are generally not planned and limited in both area and duration. Electric utilities also shutoff power to circuits for planned maintenance. In most instances, these more common power shutoffs often last for a few hours as the electric utility works to quickly restore power. Of course, power outages of longer duration do happen, particularly when weather affects the electric infrastructure, such as a snow or ice storm that topples electric poles and lines, hurricanes, or other disasters, including earthquakes or fires or unexpected maintenance issues arise, as they did when equipment failures in underground infrastructure resulted in multiple days of power loss in downtown Long Beach in 2015. Although rare, California has been no stranger to large and widespread power outages, including rolling blackouts during the energy crisis at the turn of this century and the 2011 Southwest blackout – the state's largest power failure – when problems with an out-of-state transmission line cascaded and resulted in nearly seven million people abruptly left without power in the San Diego–Tijuana area, southern Orange County, the Imperial and Coachella Valleys, along with parts of Arizona and Mexico, bringing the greater San Diego region to a complete standstill.

Nonetheless, most Californians in today's day and age have an expectation that electricity service will be available on-demand. The notion that the electric utility, itself, would proactively shutoff power to multiple circuits is a cultural shift for electric utilities and the customers they serve. Yet, as a reaction to the increased risks, impacts, and costs of wildfires, California's electric utilities have sought and been authorized to proactively shutoff power as a tool to reduce igniting wildfires. However, the use of power shutoffs can be a very blunt tool in communities that lose power – further exacerbated by the existing threat of wildfire – as the loss of power can severely challenge even the best evacuation plans. Public safety risks exist even in cases where there isn't a looming wildfire threat as the loss of power

can render a community paralyzed as businesses close, vehicles can't be fueled, communications services can be disabled, and hospitals can be inundated with nonemergency and emergency visits for those seeking electricity. The risks can grow with the duration of the power shutoff. Therefore, power shutoffs, even when planned, create issues that are imperative to address to ensure the decision to shutoff power is balanced with the risks posed to public safety and costs borne by others from the loss of power. These issues include ensuring utilities are being reasonable and judicious in deciding whether to shutoff power, ensuring adequate notification and mitigation, the state is providing adequate oversight and coordination, if needed, in response to these events, and ensuring that the utilities are considering all risks, not just those to their systems.

About proactive power shutoffs. Proactive power shutoffs are efforts by electric utilities to de-energize an electrical line or circuit in order to prevent the line from igniting a fire during certain conditions, especially high wind forecasts in areas that experience a high wildfire threat. Coined "Public Safety Power Shutoffs (PSPS)," these shutoffs are intended to be temporary but potentially endure for up to a few days, as the power is not restored until the conditions that triggered the shutoff have subsided and the electric lines are visually inspected to ensure there is no damage to the line that can spark a fire. In some instances, the line itself may not pose a fire risk, but if it is fed by lines that do, then customers receiving power from downstream lines can also lose power. While the lines are de-energized, customers on the affected circuits will not have electricity from the grid. Although there is some history with these types of proactive power shutoffs, their use as a tool to prevent sparking fires is a more recent development which has expanded and grown in use due to California's recent experience with catastrophic wildfires.

HISTORY OF PROACTIVE POWER SHUTOFFS

Southern California Edison implements temporary power shutoff program. In 2003, Southern California Edison (SCE) self-initiated and implemented a power shutoff program in response to bark beetle infestation and drought conditions that caused dead and diseased trees. SCE subsequently obtained authorization from the California Public Utilities Commission (CPUC) for its program which terminated in August 2005. During the roughly two years of the program, SCE shutoff power only one time, on October 26-27, 2003 for 26 hours to about 4,000 customers in the Idyllwild area.

San Diego Gas & Electric plans to de-energize electric lines. After a series of catastrophic fires in October 2007, some of which were ignited by electric utility infrastructure owned by the San Diego Gas & Electric (SDG&E) and propelled by

rapid Santa Ana winds, SDG&E implemented and sought several actions to reduce the risk of fire ignited by its infrastructure. The measures included replacement of wood poles with steel poles in some high fire threat areas, expansion of ground and aerial inspections of power lines and poles, disabling of some reclosers (automatic switches to restore power) that might spark fires, and staging fire crews in backcountry areas. Additionally, SDG&E sought changes to Electric Tariff Rule 14 (through Advice Letter 2025-E) to allow the utility to disrupt electricity service in order to prevent igniting a fire, while limiting its liability for resulting financial costs to its customers. The proposed changes were rejected by the CPUC who instead directed the utility to file an application to more thoroughly consider the utility's request to proactively shutoff power to electric circuits in order to prevent sparking fires.

SDG&E submits application to proactively shutoff power. In December 2008, SDG&E submitted the invited application (A. 08-12-021) which specified five conditions under which the utility would de-energize electric lines, including moisture levels in non-living and living vegetation and the air, whether the National Weather Service has called a "Red Flag Warning," and specified wind speeds. The application also included the Electric Tariff Rule 14 changes the utility sought in the earlier advice letter. SDG&E also proposed several mitigation measures, including providing 250 dollars in the form of debit cards to impacted qualified low income and medical baseline customers, generators to some critical facilities, and others.

CPUC denies SDG&E application, but acknowledges authority to shutoff power. The application was met with several concerned parties who largely opposed the utility's request to disrupt power as a tool to prevent fires, these included several water districts, disability rights advocates, schools, cable and phone service providers, local county officials, and consumer organizations. The parties universally expressed concerns about the potential dangers to public safety resulting from the loss of power. The CPUC denied SDG&E's application (D. 09-09-030) to shut off power during periods of high fire danger. The decision stated: "SDG&E has 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 areas where power is shutoff." However, the CPUC decision acknowledged the authority of electric utilities to shutoff power in order to protect public safety, noting Public Utilities Code Sections 451 and 399.2.

Parties seek modification to bolster mitigation and clarify authority. Following denial of SDG&E's application, the utility and many of the parties continued to meet, as directed by the CPUC decision, through a Fire Safety Stakeholder

Collaboration with assistance from Federal Mediation and Conciliation Services. The stakeholders discussed and proposed ways to reduce fire risks posed by the utility's infrastructure, including SDG&E's continued interest to de-energize its electric lines. The debate concerning shutting off power concerned the appropriate wind speeds used as a condition to proactively shutoff power, and adequate notification and mitigation, including of more "common" or "status quo" power shutoff events. Ultimately, one of the parties, Disability Rights Advocates (DRA)', petitioned for modification of the previous decision denying the application. DRA sought to require SDG&E to provide notice and mitigation to the extent feasible and appropriate whenever the utility shuts off power for public safety reasons.

CPUC establishes reporting requirements. In April 2012, the CPUC approved the petition for modification in part (D. 12-04-024). Specifically, the CPUC stated "the petition to modify merely formalizes an existing requirement" on the utility to "provide notice and mitigation, to the extent feasible and appropriate, whenever it shuts off power." The decision made clear that the utility is in the best position to determine whether power should be disrupted to protect public safety. However, the CPUC may conduct a post-event review with specified factors the agency may consider in determining if a decision to shut off power was reasonable and qualifies for exemption from liability under Electric Tariff Rule 14. The decision requires SDG&E to submit a report within 10 days of an event to the CPUC with specified information, including all factors considered by the utility in its decision (wind speed, temperature, humidity, and vegetation moisture), as well as, details about the number of customers affected, the duration and location of the event, and any damage to facilities, and notification and mitigation provided. The CPUC chose not to require specified mitigation measures, but noted mitigation would depend on the circumstances of each case.

CPUC extends power shutoff notification and reasonableness review to other utilities. Following several catastrophic fires in 2017, including some ignited by utility infrastructure, such as several of the North Bay fires and Thomas fire, Pacific Gas & Electric (PG&E) sought to also proactively shutoff power as a fire prevention measure. SCE had already used de-energization of electric lines in December 2017 affecting about 8,000 customers in Idyllwild, including those served by De Anza Electric Cooperative which receives power via SCE lines. In July 2018, the CPUC adopted a staff resolution to extend the reasonableness, public notification, mitigation and reporting requirements in the SDG&E decision to all electric investor-owned utilities (IOUs), including PG&E and SCE. Under Resolution ESRB-8, the CPUC also requires utilities to meet with local communities before putting the power shutoff practice in effect in a particular area, requires feasible and appropriate customer notifications prior to a de-energization

event, and requires notification to the Safety and Enforcement Division of the CPUC after a decision to de-energize facilities. In adopting the resolution, CPUC commissioners expressed a desire that the power shutoffs would only be used as a “last resort” by the utilities.

Legislature requires protocols for proactive power shutoffs. Among many of the provisions included in SB 901 (Dodd, Chapter 626, Statutes of 2018) is a requirement that the CPUC requires electric IOUs to include protocols, as part of their wildfire mitigation plans (WMPs), for disabling reclosers and de-energizing portions of the electrical distribution system that consider the associated impacts on public safety, including impacts on critical first responders and on health and communications infrastructure. The bill also requires the WMPs to include appropriate and feasible procedures for notifying customers who may be impacted by the de-energizing of electrical lines. Additionally, the procedures must consider the need to provide priority notification to critical first responders, health care facilities, and operators of telecommunications infrastructure.

CPUC opens rulemaking proceeding. In response to SB 901, in December 2018, the CPUC opened a rulemaking proceeding (R. 18-12-005) to delve more deeply into the use of proactive power shutoffs as a wildfire prevention tool, including further examining de-energization policies and guidelines. In May 2019, the CPUC made its decision on Phase 1 of the proceeding (D. 19-05-042), adopting communication and notification guidelines for the electric IOUs to expand on those required in the July 2018 resolution. More recently, in August, the CPUC opened a second phase of the proceeding to address identification and communication with the access and functional needs populations, communication with customers while the power is turned off, communication during re-energization, mitigation measures, coordination with relevant agencies (including first responders), and transmission-level de-energization. The schedule for this track of issues proposed to have a decision by first quarter 2020. However, since the October 2019 widespread power shutoffs, the CPUC has suspended that schedule with the expectation that President Marybel Batjer, the presiding commissioner, will issue a new schedule to address immediate concerns with the operations of the power shutoffs.

POWER SHUTOFF EVENTS

PSPS events. As noted above, the use of proactive power shutoffs, now referred to as Public Safety Power Shutoffs (PSPS), is a fairly new development that has expanded and grown in recent years. The CPUC website hosts most of the

required post-event reports required of electric IOUs when a PSPS is publicly noticed, including when the power is not shutoff, beginning from the fall of 2017. In that year, SDG&E filed five separate reports for PSPS events. The following year, 2018, there were an additional eight reports, with at least one from each of the three large electric IOUs. For 2019, all three of the electric IOUs have had multiple PSPS events with a current total of 14 reports posted, so far, and an additional report recently submitted. However, shutoff event reports before 2017 have not been posted and more recent PSPS event reports, including some from October PSPS events have not been posted.

PSPS Events as Reported by Utilities				
Date	Electric Utility	PSPS Area	Duration (estimated based on electric utility reports) ¹	No. Customers² without power
2017				
Sept. 21-22, 2017	SDG&E	Volcan Mountain	18 hours	3
Oct. 20-21, 2017	SDG&E	Volcan Mountain	38 hours	3
Oct. 23-25, 2017	SDG&E	North Descanso	6 – 51 hours	88
Dec. 4-12, 2017	SDG&E	Jamul, Descanso, Viejas, Alpine,	23 hours – 6 days	14,000
Dec. 14-15, 2017	SDG&E	Descanso, Japatul	9 -17 hours	650
2018				
Jan. 27-29, 2018	SDG&E	Descanso, Alpine, Poway, Japatul	5- 43 hours	5,800
Oct. 12-16, 2018	SCE	Foothills in SCE, Malibu, Santa Clarita, Thousand Oaks, Moorpark	NA	0
Oct. 15-16, 2018	SDG&E	Rincon, Descanso, Viejas	7-28 hours	379
Oct. 19-20, 2018	SDG&E	Viejas, Descasno	30 hours	19
Oct. 14-17, 2018	PG&E	North Bay, Sierra Foothills	24- 61 hours	60,000
Nov. 11-16, 2018	SDG&E	Japatul, Viejas, Julian, Rancho Santa Fe, Rincon	24-46 hours	25,000

¹ Estimated based on reports provided by the utilities. Not verified by the CPUC or another entity.

² Customer is equal to one utility account and does not include the total number of people affected. In general, the number of individuals affected can be estimated by multiplying the number of customers by 2.5 or 3 people. However a customer can also be a downstream electric utility or rural cooperative which may have hundreds, if not thousands, of customers. A customer may also be a master meter account and not include any tenants.

Nov. 5-13, 2018	SCE	Sylmar/Santa Clarita, San Bernardino, Orange, Moorpark,	5-33 hours	114
Nov. 27, 2018	PG&E	North Bay, Sierra Foothills	NA	0
2019				
Dec. 29, 2018- Jan. 1, 2019	SCE	Orange	15 hours	34
Jun. 7-9, 2019	PG&E	Sierra Foothills, North Bay	24 hours	22,000
Jun. 27-22, 2019	SCE	Kern, Sun Village, Palmdale	NA	0
Jun. 28- Jul. 8, 2019	SCE	Kern, Riverside, San Bernardino	NA	0
Jul. 9-21, 2019	SCE	Tejon, Riverside, San Bernardino, Santa Barbara, Mono, Tulare, Ventura	NA	0
Aug. 12-17, 2019	SCE	Counties: LA, Kern, Riverside, Tulare	NA	0
Sept. 4-8, 2019	SCE	Tulare, Santa Barbara, LA, Riverside, Kern, Mono, Inyo, San Bernardino	NA	0
Sept. 25-27, 2019	PG&E	North Bay and Sierra foothills	25-32 hours	75,000
Oct. 5-6, 2019	PG&E	North Sierra foothills	11 hours	11,300
Oct. 2, 2019	SCE	Counties: LA, Ventura, San Bernardino, Kern	Various times	23,824
Oct. 9-12, 2019	PG&E	Numerous communities throughout service territory	52 hours	732,000
Oct. 12-21, 2019	SCE	Mono, Kern, San Bernardino, LA County	Various	300
Oct. 23-25, 2019	PG&E	Sierra Foothills, North	4-52 hours	177,000

		Bay/Mendocino, San Mateo, Kern		
Oct. 21-26, 2019	SCE	Kern, LA, San Bernardino, Riverside, Ventura Counties	Various, about 25 hours	30,263
Oct. 24-26, 2019	SDG&E	Viejas, Japatul, Descanso, Julian, Palomar, Rincon, Poway	13 mins – 58 hours	20,621
Oct. 28-Nov. 1, 2019	SDG&E	Viejas, Japatul, Descanso, Julian, Palomar, Rincon, Poway	7-40 hours	27,703
<i>October 2019: Missing additional events. Not all reports have been filed.</i>				

With regard to any post-event review, the CPUC has conducted only one review of PSPS events. In May 2018, the CPUC published a review for the two December 2017 SDG&E PPS events. In its review, the CPUC’s Safety and Enforcement Division concurred with SDG&E’s evaluation that (1) at the time there was a real and significant risk of wildfires, (2) the utility’s actions appear to have been reasonable and consistent with factors specified in D.12-04-024, and (3) the utility complied with the required reporting requirements. The CPUC review did note the opportunity for improvements for how SDG&E communicates and mitigates the impacts of de-energization.

October 2018 PPS events. Each of the three electric IOUs had at least one PPS event in October 2018. The largest PPS notification was sent by SCE to about 116,000 customers located in four counties, although SCE would not de-energize any lines. The largest de-energization event was by PG&E who notified about 100,000 customers in about a dozen counties in the Sierra Foothills and North Bay areas. The power would ultimately be shut down from October 14th to 17th, affecting about 60,000 customers, mostly in the North Bay. The multiple day event resulted in many customer complaints and media stories regarding the loss of power in several communities. In the case of SDG&E, the utility had two separate events. The first, in the early part of the month, de-energized one circuit for about 18 hours affecting 19 customers in the Viejas region of San Diego County. The second incident also overlapped with the events by the other utilities, October 15-16. SDG&E de-energized two transmission lines which affected no customers and two distribution circuits that affected the same 19 customers in the Viejas region for about 11 hours, along with an additional 360 customers in the Rincon area of San Diego County for about seven hours.

Joint Agency Letter issued to electric IOUs. After the October 2018 events, a joint agency letter was sent by the CPUC, California Office of Emergency Services (CalOES) and California Department of Forestry & Fire Protection (CalFIRE) to all three electric IOUs establishing expectations for potential PSPS events in light of “recent actions” by the three IOUs to de-energize power lines during high wildfire danger weather conditions which “make clear that utilities must provide specific, real-time information so that the State can take appropriate steps to ensure public safety.” The letter covered several issues, including: notifications at several distinct stages of a PSPS event to the California State Warning Center, with specified information, including a point of contact, at least three briefings per day of the event, real-time data and maps, and Geographic Information Systems (GIS) datasets (including polygon of planned outage areas, customers affected, outage areas, impacted circuits, and impacted critical customers). Within a week, the three electric IOUs responded with a joint letter of their own where they identified general areas that would benefit from additional discussion, including implementation details, data needs, and customer information.

September/October 2019. With high speed winds forecasted, as can be typical in California during the fall months (offshore warm Santa Ana winds in the southern part of the state and Diablo winds in the north), PG&E sent PSPS notifications at the end of September to a widespread region of its service territory and ultimately shutdown power in roughly two events to 76,000 customers in the North Bay and Sierra Foothill areas. This was the first back-to-back PSPS event for PG&E in the same geographic area. These power shutoffs lasted about 24 hours or less, depending on the circuit and seemed to set the stage for continued PSPS activity throughout the month of October. As the table above notes, there were multiple PSPS events in October within the service territories of each of the three large electric IOUs. In some cases, especially in the PG&E territory, these events bled into each other with customers experiencing extended days with loss of power, as the utility did not have enough time to complete inspections of the de-energized electric lines before the next PSPS event was triggered. In total, over two million California residents endured the loss of power, in communities located in about 40 of the state’s 58 counties. These incidents became even more challenging as wildfires in both northern (including the Kincaid Fire) and southern California (including Saddleridge and Maria Fires) also meant some evacuations needed to be executed with no reliable phone or communication service, traffic signals were out, schools closed, and hospitals struggling to keep the lights even with their existing backup generators. Additionally, customer efforts to understand what and where the loss of power was happening were hampered as electric IOU websites were down – including PG&E and SCE. The increased attention and widespread nature

of the outages meant significantly increased traffic to each of the utilities' websites which they were not prepared to manage. There were also reports about unreliable maps and confusing information regarding geographic areas that would be affected, this was especially acute in the PG&E territory. Customers who rely on electricity for medical devices struggled to find alternative sources of power or transportation to get to any of the limited community resource centers available to them, or to make contact with anyone who could help. The State agencies, including Health and Human Resources, attempted to provide additional support. Local agencies, including counties, cities and special districts, from first responders to water utilities, struggled to provide support for their residents.

Post-event actions. In the midst of the October PSPS incidents, the Governor sent a letter to the CPUC and to PG&E expressing his concerns and expectations regarding the use of PSPS. The Governor stated the October 9th PSPS events by PG&E were unacceptable and he directed the utility to rebate all affected customers with \$100 credit for residential customers and \$250 credit for small businesses. The utility originally balked at the rebates, until a couple weeks later the utility agreed to rebates/credits for customers from the October 9th event. Additionally, the CPUC sent letters to the three electric IOUs. Notably, the CPUC held an emergency meeting on October 18th regarding the PSPS events in PG&E territory. PG&E's Chief Executive Officer Bill Johnson expressed his views that the company had areas to improve but that PSPS would be needed, potentially for as long as 10 years, until the utility could implement sufficient other measures, such as grid hardening, sectionalizing, and other measures that would reduce the need for PSPS. The CPUC also sent letters to the utilities directing them to share information with first responders about customers on a medical baseline program who require electricity to operate medical devices and another regarding the need to share information with the counties and tribal governments. Last week, the CPUC announced it would open an investigation into the conduct of the electric utilities to ensure they appropriately balanced the requirements to provide safe and reliable service when planning and executing their recent PSPS events. The CPUC also recently announced an investigation into the conduct of telecommunications service providers who also experienced extensive service outages (*see below*).

PSPS issues. A number of issues are raised with the use of power shutoffs. While today's hearing won't resolve all of the issues, they are important to consider in the policy discussions regarding the continued use of PSPS by the electric utilities. These include, but are not limited to:

- Does PSPS improve or harm public safety?
- What criteria would define using PSPS as a last resort?

- What additional state oversight is necessary to improve public safety for Californians, including to critical facilities, essential services, and those with medical, and access and functional needs?
- Who should bear the costs associated with power shutoffs?
- What additional support can be provided to protect public safety?
- Should the electric utilities provide improved mitigation for those in need of electricity during a PSPS?
- How can coordination be improved among utilities and responding agencies, including special districts?
- How should data sharing be improved among agencies, while protecting customers' and residents' privacy?

TELECOMMUNICATIONS SERVICE

Telecommunications outages may have been longer and more widespread than electric power outages. Telecommunications services rely on electric power for operation. During outages, some facilities have back-up power; however, not all facilities have the same amount of back-up power and some facilities have no back-up power. In anticipation of the PSPS events, the Federal Communications Commission (FCC) activated the Disaster Information Reporting System (DIRS), which is a voluntary mechanism for wireless, wireline, and cable subscribers to report outages. While the information in DIRS may not be complete due to its voluntary nature, the table below indicates that telecommunications outages extended beyond the duration of the power outages and the scale of the outages indicates that a significant number of facilities do not have extended backup power.

PSPS Date	Wireless Cell Sites Out	Wireline/Cable Subscribers Out	Electric Customers Out
10/24/19	51	11,476	36,301
10/25/19	32	1,476	940,170
10/26/19	630	393,735	952,373
10/27/19	874	454,722	980,639
10/28/19	463	223,973	473,139
10/29/19	476	173,058	388,644
10/30/19	263	117,577	129,980
10/31/19	110	54,463	400

**Data reported by the FCC and CalOES. These may not be final numbers.*

Why were the outages significantly worse in certain regions? The DIRS data shows that the outages disproportionately impacted certain communities. For example, the data shows that wireless outages in Marin County grew from 49.6 percent of cell towers out on October 26, 2019, to 57 percent of the county's cell towers out on October 27, 2019. However, it is unclear why Marin County experienced more pervasive wireless telecommunications outages than other counties that were equally impacted by the PSPS. Additionally, the size and scope of the outages indicate that some communities had no telecommunications service due to simultaneous outages of wireless, wireline, and cable facilities. These significant losses of telecommunications service can impact public health and safety of communities by limiting the ability to call 9-1-1 and receive emergency notifications. Additionally, these outages can limit the public's ability receive notifications from utilities about the status of power outages and restorations.

Wireless outages: best laid plans? On September 12, 2019, the FCC sent letters to the major wireless carriers requesting information about how the carriers intended to ensure the operation of wireless service during a PSPS event. While several carriers noted the unpredictable nature and short time frame for PSPS notifications, none of the companies indicated that they would have large scale outages during a PSPS event. All the companies' responses indicated that they had backup power integrated into their emergency plans. Despite these plans, outage data shows that some communities lost cell service for a significant period of time. At the time of printing, all four large wireless companies in California (AT&T, Sprint, T-Mobile, and Verizon) provided information to this committee about the types of backup power supplied to their facilities. This information indicates that companies generally ensure that major transport facilities (e.g. switching offices, major backhaul hubs) have at least 48 to 72 hours of on-site generation. These companies also deploy mobile generators to facilities where permanent generation cannot be installed. However, not all cell sites can accommodate mobile generators. These sites include cell facilities on building tops, cell facilities where the property owner does not permit the installation of generators, and facilities where space and topography limits the placement of a large generator. Small cell sites (such as 5G) generally cannot include backup power due to their placement on municipal street lights and power poles.

While the number of wireless facilities impacted by outages may have been lower than those for wireline and cable providers, wireless outages have the potential to impact a greater number of consumers because a larger percentage of the population relies on wireless communication as its primary means of communication. According to the Centers for Disease Control (CDC), more than 50 percent of all households rely exclusively on wireless telecommunications, and

Latino and African-American adults are more likely to live in households that rely solely on wireless communications. The CDC's data also shows that 70 percent of renters between 25 and 34 years of age rely solely on wireless communications.

Wireline and cable outages: the vulnerability of internet communications. Outage information from the FCC demonstrated that wireline and internet-based outages were significant during PSPS events. These outages highlighted consumers' lack of awareness about the distinctions between copper-based phone service and internet-based phone service. In the event of a power outage, copper-based communications can retain service with a generator for a longer duration than internet-based services, which rely heavily on electricity supplied at multiple sites along the network, including the consumer's address. Many Californians were unaware that their home phone service was provided through an internet connection and were unprepared to lose communications. Internet communications' reliance on the electrical grid also increases the likelihood of internet and cable outages outside the footprint of a PSPS event. If a cable/internet provider's facilities lose power, all the customers served by those facilities will lose telecommunications, regardless of whether those customers lose power themselves. For residents, this loss of communications frequently means the absence of home phone, television, and internet service. For businesses, it can mean loss of electronic payment systems, access to electronic records, and other internet-based services.

Little public information exists about the use of backup power by cable and internet providers. Outages indicate that a large number of cable and internet facilities may have no backup power and that cable and internet facilities may face additional hurdles re-powering after an outage. During the outages, cable and internet providers acknowledged that their outages could persist beyond the PSPS event. In news reports, representatives for Comcast acknowledged that outages extended beyond the PSPS duration and geographic footprint, and data from DIRS shows that even after electric utilities completed power restorations, large telecommunications outages persisted. Comcast representatives also stated that the company did not deploy generators except in a limited number of circumstances, such as a request by the Federal Emergency Management Agency (FEMA). Internet outages posed challenges for emergency responders; Sonoma County's emergency operations center indicated that it experienced difficulties with its internet service during emergency response operations due to outages from its internet service provider.

Emergency response and coordination: lessons learned. The recent PSPS events highlighted the need for more verifiable information about the resiliency of the

telecommunications network as well as the need for inclusion of telecommunications planning in PSPS preparations and emergency response coordination. While the outages indicated that telecommunication providers had not sufficiently planned for the scope and duration of potential PSPS events, they also highlighted challenges in effectively addressing difficulties posed by the dynamic nature of PSPS events. Multiple communications providers sought to deploy additional mobile backup generators; however, they had not fully anticipated the logistical hurdles to transporting and repositioning a large number of out-of-state diesel and propane generators as well as the re-fueling of these generators. These challenges included, but were not limited to, the following:

- A lack of reliable notification and maps from electric utilities identifying areas targeted for PSPS events.
- Restrictions on the size of vehicles that can be used to transport mobile generators from outside of California.
- The rapidly changing scope of PSPS activities.
- The absence of a centralized and streamlined process for coordinating with local officials responsible for coordinating and permitting the placement of emergency generators.
- Local restrictions on the placement and run time of generators.