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Good morning Chairman Murkowski, Ranking Member Manchin and members of the Committee. My name is Bill Johnson, and I am Chief Executive Officer and President of PG&E Corporation.

I am pleased to appear before the Senate Committee on Energy and Natural Resources on the issue "To examine the impacts of wildfire on electric grid reliability and efforts to mitigate wildfire risk and increase grid resiliency." PG&E appreciates the time and consideration the committee and Congress are giving to wildfire mitigation and grid reliability and resilience matters.

PG&E Corporation is a holding company headquartered in San Francisco, California. It is the parent company of Pacific Gas and Electric Company (PG&E), an energy utility with approximately 23,000 employees, which operates and maintains more than 100,000 miles of electric transmission and distribution lines, and 49,200 miles of gas transmission and distribution lines, delivering energy service to 16 million Californians across a 70,000-square-mile service area in Northern and Central California.

As the Federal Power Act recognizes, safe, affordable, and reliable energy service is foundational to economic prosperity and individual livelihood. This is an incredible responsibility, and what our customers expect and deserve. For more than a century, all of PG&E's equipment, technology, processes, procedures, and expertise has been developed with the goal of keeping the energy flowing with as few interruptions as possible.

And yet this fall, PG&E intentionally, proactively, and repeatedly turned off power for millions of our customers, over large sections of our service area. We did this for one reason only and that is keeping customers and communities safe. These Public Safety Power Shutoff (PSPS) events were enormously disruptive to people's daily lives, challenged essential systems our society depends on, and put some of our most vulnerable citizens at temporary risk.

Nevertheless, we have no doubt that given the climate-driven circumstances we now face in California, and the fast-moving catastrophic wildfires that devastated communities over the last two years, including those ignited by electrical equipment, shutting off the power was the right thing to do. Those actions helped keep people safe.

Changes in the Risk Landscape

Like any home, building or other infrastructure, electric transmission and distribution lines and related infrastructure are vulnerable to extreme weather conditions, including

hurricane strength winds. This creates conditions in which utility equipment can come in contact with surrounding vegetation or other objects, potentially resulting in wildfires, as we have unfortunately witnessed.

Over the last several years, California has experienced its largest wildfires in history, including last year's Camp Fire, the most destructive, with over 80 fatalities and extensive property loss.

These wildfires are tragic and devastating. PG&E is deeply sorry for the role our equipment had in some of those fires and is taking action to address the increased wildfire threat in which our infrastructure now operates.

Our efforts began with understanding the rapid and dynamic climate-driven changes that have occurred in PG&E's large and complex service territory, and what we must plan for going forward.

Over recent years, California has experienced a prolonged, record drought, unprecedented tree mortality, heat waves, and changing Diablo offshore winds that have resulted in a significant and an unforeseen increase in wildfires and the wildfire threat.

Between 2010 and 2018, according to the U.S. Forest Service, over 147 million trees in California alone have died from drought and invasive beetles. PG&E estimates there are more than 100 million trees adjacent to its overhead power lines with the potential to either grow into or fall into the lines.

Moreover, as air temperatures rise, forests and land are drying out, increasing fire risks and creating weather conditions that readily facilitate the rapid expansion of fires.

In fact, just seven years ago, only 15 percent of PG&E's service area was designated as having an elevated wildfire risk. Today, over 50 percent of PG&E's service area is designated as a high fire threat area by the California Public Utilities Commission (CPUC) and CAL FIRE. This means that now, over 30,000 miles of PG&E's assets are exposed to a higher wildfire risk – more than a tripling of the threat in less than a decade.

This risk will continue to worsen over time, with projections for an increase in average annual area burned by wildfire to 16 percent in 2025, and another 42 percent by 2050.

In short, the past is no longer a predictor of the future as we experience the increased risk, magnitude, and devastating impacts of wildfires. PG&E is adapting to this new reality expeditiously and transparently.

PG&E is Taking Action with its Wildfire Safety Plan

Building upon additional safety precautions the company began implementing in 2017 and 2018, this year PG&E developed and received approval for its 2019 Wildfire Safety Plan from the CPUC.

The plan is an expansion of enhanced and additional safety precautions given the increased and growing wildfire threat, addressing various wildfire risk factors, based on an analysis of known fire ignition causes from electrical equipment, and consequences of failure that include population density and limited egress, through benchmarking and learning the best practices of others.

It is comprised of three elements: 1) bolstered situational awareness, wildfire prevention and emergency response efforts; 2) new safety measures that include accelerated safety inspections, enhanced vegetation management, and Public Safety Power Shutoffs, and 3) doing more over the long term to harden the electric system to help reduce wildfire threats and increase resilience for our customers and communities.

To date, PG&E has undertaken a significant amount of work and made tremendous progress. For example, PG&E has installed more than 600 weather stations and 130 high-definition cameras across its service area. PG&E will continue to expand these networks to enhance weather forecasting and modeling and improve the company's ability to predict and respond to extreme wildfire danger. PG&E is on track to install a total of 1,300 weather stations and 600 cameras by 2022, a density of one weather station roughly every 20 circuit miles and video coverage of roughly 90 percent of the high-risk areas.

This data is leveraged at PG&E's Wildfire Safety Operations Center (WSOC), which serves as PG&E's 24/7 hub for monitoring wildfire risks and coordinating prevention and response efforts across Northern and Central California.

We also finished an unprecedented process to inspect every element of our electric system within the high fire-threat areas in 2019, comprised of almost 750,000 transmission, distribution and substation structures and over 25 million electrical components in those areas. We climbed these structures, we used drones and we performed 18 months of inspections in only four months.

Whenever we found equipment that needed immediate repair, we fixed or replaced it. We have assured that every piece of electrical equipment within and next to the high fire-threat areas is suitable to serve our customers and the broader system.

On managing vegetation along our rights-of-way alone, we have spent approximately $3.8 billion since 2009. Our vegetation clearance efforts continue to meet important state vegetation and fire safety standards through routine vegetation management work, which require clearances of 4 feet around power lines in high fire-threat areas, with recommended minimum clearances of 12 feet or more at time of prune to ensure compliance year-round.

PG&E is taking this work a step further to proactively address forest health management and fire risk reduction, including analyzing tree failure patterns across different species; using advanced detection techniques to help predict tree failures; and patrolling of power lines in high danger areas.

We are grateful for the partnership of our federal land partners in providing us the access needed to conduct these inspections and vegetation management work.

Beginning in 2017, PG&E disabled automatic reclosing, switches used on distribution lines to detect and interrupt momentary faults, in high fire-threat areas during wildfire season and periods of high risk, and is upgrading more reclosers and circuit breakers with remote control capabilities.

PG&E is installing stronger and more resilient poles and covered power lines, including targeted undergrounding, starting in areas with the highest fire risk, ultimately upgrading and strengthening approximately 7,100 miles over the next 12-14 years. To date, PG&E has completed 129 miles of hardening work.

Also included in the 2019 plan is an expansion of the PSPS program to include all electric lines that pass through high fire-threat areas – both transmission and distribution – and the creation of 40 new resilience zones that can power central community resources during these events by 2022.

PG&E's Commitment to Safety

Proactive de-energization to reduce the threat of catastrophic wildfires is a recognized best practice and is part of PG&E's Wildfire Safety Plan, required by California state law. As outlined in that plan, PG&E has established protocols to guide our decisions to turn off the power, which is driven by weather conditions (Red Flag Warnings, high winds, low humidity levels, and condition of vegetation) that have the potential to damage our powerlines and other equipment.

PG&E appreciates its ability to use data from the federal government, including the National Weather Service and NOAA satellites, to help us understand these weather conditions.

Recognizing the immense impacts that these events have, PG&E began an aggressive outreach campaign before wildfire season to increase awareness and preparedness with first responders, local communities, and customers for such outages. This outreach included distributing over 18.8 million PSPS-related direct mail pieces and 17.1 million emails, as well as conducting over 1,000 in-person stakeholder meetings, 23 open houses, 17 workshops, and 6 webinars.

In developing the scope and throughout PSPS events, PG&E remains committed to working in partnership with first responders and impacted counties in real time and is continually working to improve our communications about PSPS events with customers. That includes providing as much notice as possible of a potential PSPS event to those impacted, 48 hours when possible, as well as notifying those that will not be impacted as our event evolves.

Resources available during these events include Community Resource Centers, where restrooms, bottled water, coffee, snacks, electronic-device charging and air-conditioning are available.

Before a PSPS event, crews visually inspect PG&E's powerlines that are in scope for a potential event to provide on-the-ground conditions that factor into our decision making. After the weather clears and it is safe, crews again inspect the impacted power lines and make any necessary repairs or corrective actions, so that an ignition does not occur upon re-energization.

As we continued the program during this year's wildfire season, PG&E experienced challenges and incorporated lessons learned in subsequent events. Those include improved capacity to respond to customer call volume and web traffic, coordination with local counties, and minimizing the PSPS impacts. For example, we expanded the services offered at our Customer Resource Centers, deployed temporary generation, including up to 65 megawatts during the late October events, and began testing infrared technology to conduct inspections at night in order to reduce restoration times.

Throughout these events, our most important responsibility is the safety of the customers and communities we serve. We can and will improve our execution through better pre-planning and coordination with first responders and government partners, and better anticipating the needs of PG&E's vulnerable customers. PG&E is conducting in depth, in person after action reviews now through early next year to incorporate feedback and lessons learned.

This year, PG&E's PSPS program achieved its singular goal: there was no loss of life during wildfires in 2019 – despite some of the most extreme fire-season conditions that our region has seen in decades. Our extensive analysis of the wind-related damage and hazards to our de-energized lines shows that had the power remained on when the danger was highest, fire would have been the likely result.

We know that our work will never be done when it comes to protecting human life and public safety – and we are determined to get it right.

At the same time, we know with just as much certainty that repeatedly turning off the power for millions of people in one of the most advanced economies in the world – even in the interests of safety – is not a sustainable solution to the wildfire threats we face.

Planning for the Future with Customer-Based Solutions

I want to assure you that we do not expect an annual repeat of what we went through this fall. We are working hard now to narrow the scope and duration of future safety shutoffs and minimize their customer impact as much as possible.

This includes evaluating new technologies such as sensors to detect emerging conditions on the electric grid and improve situational awareness, use of artificial intelligence and hyperspectral imaging of vegetation, and testing equipment that has been successfully deployed in Australia to reduce the risk of causing a spark from a falling power line before it hits the ground.

We are partnering with communities to create new microgrids or "resilience zones" with the potential of powering central community resources during a PSPS or other loss of power event.

In addition to our engagement with California's state and local agencies, at the national level, PG&E is continuing to work in coordination with the Edison Electric Institute and its Board of Directors to focus on industry's efforts to manage and mitigate wildfire risks.

Earlier this year, the Electricity Subsector Coordinating Council (ESCC), which represents investor-owned electric companies, electric cooperatives and public power utilities, expanded its focus to include wildfire issues. Initially the ESCC, along with the Departments of Energy, the Interior, and Agriculture, will focus on enhancing wildfire safety, prevention and response, including permitting and land management policies, and deploying technological advancements. The Grid Modernization Lab Consortium (GMLC), a strategic partnership between the Energy Department and the National Laboratories, is also a key partner in this effort.

We are constantly striving to improve our execution and addressing the impacts of PSPS events, as we comprehensively address the risks of fire ignitions and spread so that future shutoffs become smaller and shorter.

This is not a simple problem. And it is not limited to California. Electric power companies in other parts of the Western United States are seeing some of the same factors at work in their service areas and are looking to adapt their systems to this new reality, including consideration and implementation of protocols to proactively de-energize for safety.

Federal Policy Solutions to Increase Wildfire Resilience

PG&E fully supports the common sense, meaningful steps taken by Congress over the years to prevent catastrophic wildfires, and you can be assured that we will remain an active voice in sharing our experiences related to reducing wildfire risk.

We appreciate all the efforts made to date by Congress to reduce the wildfire risk and keep our customers and the communities we serve safe. More specifically, we applaud the previous, 115th Congress for advancing comprehensive legislation (now Public Law) that includes provisions to: 1) modernize how utilities manage vegetation along utility rights-of-way that cross federal lands; and 2) provide realistic solutions to fire borrowing so the federal government can complete its maintenance and prevention work.

With respect to the vegetation management policy, we remain hopeful that the U.S. Forest Service and Bureau of Land Management will implement policies in 2020, as mandated by Congress, that respect congressional intent, including its commitment to electric reliability and public safety.

We also applaud Congress' decision to include Unmanned Aerial System (UAS) provisions under the Federal Aviation Administration Act. These important policies allow utilities to apply for a beyond visual line of sight (BVLOS) waiver, which can be utilized for emergency response and to speed up restoration following storms, outages or PSPS events.

PG&E also thanks Congress for advancing the National Defense Authorization Act (NDAA), which includes important wildfire-related provisions authorizing the U.S.

Department of Defense to report out on the feasibility of using satellite and other aerial technology, like Unmanned Aerial Vehicles, to detect wildfires at ignition. It also requires reporting the location of such fires to first responders once the incident is detected.

While these steps on the federal legislative front have been encouraging, we believe additional action at the federal level is necessary to further reduce wildfire risk.

More specifically, Congress should focus on addressing the following areas:

Protect Energy Affordability for Low-Income Customers – Increasingly frequent and destructive climate events require utilities to rebuild and reinforce energy infrastructure – whether it is rebuilding power lines after a storm or installing new grid technologies to mitigate damage in the future. In most cases, the costs of these efforts fall on consumers. Congress should examine assistance programs that provide eligible customers relief from increasing electricity costs that result from climate adaption and resilience. A program modeled after the federal Low-Income Home Energy Assistance Program (LIHEAP) or creating a resilience tax grant program would ease the burden of utility bills for those low-income Americans who meet relevant criteria.

Continue to Fund Forest Management, Fire Suppression Activities – There are approximately 147 million dead or dying trees in California that increase the risk of wildfires. Congress should continue to fully fund federal agencies and support public-private partnerships charged with managing forests on federal lands. Additionally, Congress should continue to provide federal firefighting programs with sufficient funding to cover the costs of suppressing an increasing number of wildfires. If federal land managers do not have sufficient wildfire suppression costs, they can be forced to divert funding from forest health and fire prevention programs.

Ensure Administration Implements Forest and Vegetation Management – Congress must ensure that the U.S. Departments of Agriculture and the Interior implement measures passed by Congress that allow utilities to better manage vegetation near their infrastructure on federal lands. Congress should also consider advancing legislation to complement certain policies outlined in Executive Order (EO) 13855, “Promoting Active Management of America’s Forests, Rangelands, and Other Federal Lands to Improve Conditions and Reduce Wildfire Risk.”

Ensure Access to Federal Lands for Prevention, Response – Limited accessibility to some federal lands can compromise first responders’ ability to access and respond to wildfires. Lack of roadways and restrictions on aircraft usage, for instance, can complicate efforts to respond swiftly and forcefully to fires as soon as they are identified. Congress should work with the Executive Branch, state and local emergency responders to identify and remove artificial barriers that can inhibit quick response. Additionally, the federal government should establish standardized approaches, in coordination with utilities, to address routine utility maintenance work on federal lands.

Authorize Regional Operations and Maintenance Plans – Promote coordination and cooperation by adopting regionally-based templates for operation and maintenance plans, which establish consistent work practices with clear expectations of the federal land agencies and utilities. At the same time, it is important to clarify work-streams that can be performed with notifications and those which require prior agency review and approval. To the extent possible, steps should be taken to promote joint preparation of National Environmental Policy Act documents among federal agencies for vegetation management activities to maximize efficiency and coordination, while ensuring consistency with applicable land management plans and policies, and applicable law.

Enable Federal Agencies to Share Satellite Data on Wildfire Detection – Most wildfire detection occurs when someone sees an outbreak and informs first responders. Since fire outbreaks can occur in very remote areas, a fire can burn for a long time before human identification. Modern satellite technology operated by the U.S. Department of Defense can detect an outbreak almost instantaneously – when the wildfire covers an area as small as 100 square feet. Under certain circumstances, DoD can share geospatial data with other federal agencies. Congress should encourage the Defense Department to institute a data-sharing program with the U.S. Forest Service through which it would be immediately notified if the Defense Department satellites detect an outbreak, allowing the Forest Service to alert local authorities and coordinate a quicker response.

Promote Resilient Communities – There are many ways Congress can promote resilience in the local communities they represent, and among their constituents including (but not limited to): promoting public-private partnerships to design, develop and fund resilience projects; establish voluntary resilient zoning and building codes and standards, using the LEED certification program as a model, and providing economic incentives for customers and communities in disaster prone areas; incorporating climate resilience in future federal spending and planning decisions to maximize infrastructure lifespans; and ensure continued federal government support for programs supplying climate change research, modeling and data collection, knowledge sharing and transfer, and funding for climate resilience planning and implementation.

Federal Support for Research and Development – The federal government can play a critical role in advancing research, development and deployment of the technologies that can allow utilities to better plan for and increase their wildfire resilience. Such technologies could include: 1) technologies to harden electric infrastructure in the face of wildfire risks, such as faster, more intelligent reclosers and improved “downed line” technologies; 2) improved sensor technology for electric transmission and distribution lines; 3) analytical tools to better model the impacts of climate change on energy infrastructure; and 4) long-duration energy storage systems and advanced, low-emission mobile generation systems that can provide power during outages.

Comprehensive study of wildfire causes, impacts, and recovery – Congress should request a comprehensive evaluation of recent events by the Government Accountability Office. The study should evaluate the direct and indirect causes and contributing

factors of recent large-scale wildfires; the federal, state, and local response efforts; and other relevant factors with a focus on critical infrastructure impacts and resilience. The report should provide recommendations for improving critical infrastructure resilience, enhancing emergency response, modernizing vegetation management and forest practices, assessing rural planning and zoning policies, and improving government coordination.

PG&E believes these common sense, much-needed federal policies can be accomplished in a responsible and bipartisan manner that will have a positive impact on reducing wildfire threats, improving safety and the environment, and increasing overall resilience.

Conclusion

The issue of grid resilience is distinct and just as important for all Americans as reliability. Utilities across the country face multiple threats to our infrastructure including climate-driven risks and others such as cyber and physical security threats.

Resilience to any of these threats requires a comprehensive, societal approach and partnership with multiple stakeholders, including government partners. The work will never be complete and the hazards will continue to evolve

The challenge of providing electric service in an increasingly hazardous environment is one that our company must – and will – master for our customers. And we welcome the attention and partnership of this committee and the 116th Congress in the effort.

Thank you for the opportunity to testify today.