Company: San Diego Gas & Electric Company (U 902 M)
Proceeding: 2024 General Rate Case – Track 2
Application: A.22-05-016
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CHAPTER 1

REVISED PREPARED DIRECT TESTIMONY OF

JONATHAN WOLDEMARIAM

ON BEHALF OF SAN DIEGO GAS & ELECTRIC COMPANY

(TRACK 2 - WILDFIRE)

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

February 9, 2024

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I. INTRODUCTION AND SUMMARY

A. Summary of Testimony

San Diego Gas and Electric Company's (SDG&E)s safety-first culture is embedded in every aspect of the company's work, and particularly in its focus on wildfire safety. As required by California Public Utilities (Pub. Util.) Code § 8386(a) and other applicable statutes and regulations, SDG&E constructs, maintains, and operates its electric system in a manner that minimizes the risk of catastrophic wildfire posed by its electric power lines and equipment. SDG&E's wildfire mitigation program addresses risk reduction deemed necessary by the state Legislature and the California Public Utilities Commission (Commission or CPUC), and important to protect the safety of SDG&E's customers, employees, and the communities we serve, and includes the following:

- Reducing the risk of ignition resulting from utility infrastructure;
- Minimizing the risk of an ignition growing to a catastrophic wildfire;
- Reducing the use and impacts of Public Safety Power Shutoff (PSPS) and improving reliability during emergency conditions; and
- Adhering to requirements established by SDG&E's regulatory bodies, including the Commission and the Office of Energy Infrastructure Safety (OEIS or Energy Safety).

Wildfire mitigation has been at the core of SDG&E's focus since catastrophic utility-related fires led in part to two fatalities, dozens of injuries, and caused hundreds of millions of dollars in damages. Since the catastrophic wildfires that impacted SDG&E and its service territory in 2007 and 2008, SDG&E has established itself as an industry leader in wildfire mitigation. These efforts have been recognized by the utility industry, California state officials,[1] and leading credit

[1] Governor Newsom's Strike Force, *Wildfires and Climate Change: California's Energy Future* ("Strike Force Report") (April 12, 2019) at 11, available at https://www.gov.ca.gov/wp-

ratings agencies.[2] S&P Global Ratings described SDG&E's position on the forefront of wildfire innovation as follows:

> Over the past decade [SDG&E] has been a leader in wildfire prevention through the implementation of technology and system hardening. These measures reduce the probability that the company will be the cause of a catastrophic wildfire. As a direct result of the company's proactive ingenuity . . . the company has developed a strong track record of either avoiding wildfires or not being the cause of a catastrophic wildfire.[3]

The risk of wildfire in San Diego County remains the highest in the state.[4] The Commission has recognized the risk of catastrophic fires in Southern California since 2007,[5] and the heightened risk associated with specific areas of SDG&E's service territory within the High Fire Threat District (HFTD).[6] Approximately 64% of SDG&E's service territory is within the HFTD, where there is an increased potential for wildfires. The HFTD consists of two areas:

1) Tier 2, "where there is an elevated risk for destructive utility-associated wildfires," and;
2) Tier 3, "where there is an extreme risk for destructive utility-associated wildfires."[7]

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content/uploads/2019/04/Wildfires-and-Climate-Change-California%E2%80%99s-Energy-Future.pdf?emrc=640077da6cc9b. ("SDG&E engaged in a robust fire mitigation and safety program after experiencing devastating fires in its service territory in 2007 and has become a recognized leader in wildfire safety.") *See also* Governor's Office of Planning & Research, *Final Report of the Commission on Catastrophic Wildfire Cost and Recovery* (June 17, 2019) at 7, available at https://opr.ca.gov/docs/20190618-Commission_on_Catastrophic_Wildfire_Report_FINAL_for_transmittal.pdf. ("[SDG&E] is widely recognized as a global leader on utility wildfire practices.")

[2] *See* S&P Global Ratings, *How are California's Wildfire Risks Affecting Utilities' Credit Quality* (Jun. 3, 2021) at 10, available at https://www.spglobal.com/ratings/en/research/articles/210603-credit-faq-how-are-california-s-wildfire-risks-affecting-utility-credit-quality-11954953. (referring to SDG&E as a "global leader" in wildfire mitigation).

[3] S&P Global Ratings, *Ratings Direct, San Diego Gas & Electric Co*., (Jun. 30, 2020) at 2.

[4] *See* Direct Testimony of Thom Porter at TP-1.

[5] Decision (D.) 17-12-024 at 5.

[6] *Id.*

[7] *Id.* at 2.

Although wildfire risk is not limited to the HFTD, the majority of the risk is associated with conditions present in Tier 2 and Tier 3 areas. SDG&E estimates that roughly 61.4% of the ignition consequences will occur in Tier 3, 36.2% in Tier 2, and only 2.4% in the non-HFTD.[8] Because SDG&E prioritizes many of its wildfire mitigation efforts based on risk, the majority of SDG&E's wildfire mitigation initiatives are targeted and prioritized in the HFTD.

Mitigating the risk of ignition in the HFTD also results in qualitative benefits throughout SDG&E's service territory. For instance, a catastrophic wildfire that starts in the HFTD has the potential to spread outside the HFTD—which occurred during the 2007 Witch Fire—posing a safety threat to additional homes, businesses, and lands. Additionally, fires that burn entirely within the HFTD may result in impacts outside of the burn area, including reduced air quality due to smoke and other environmental impacts. Fires also "poison[] the air across vast swaths of the state," putting public health at risk and emitting millions of carbon particles into the air, compounding the challenge of reducing greenhouse gas emissions.[9] Thus SDG&E's efforts to reduce the risk of catastrophic wildfire positively impact the entirety of its customer base and the overall public.

After the catastrophic fires of 2017 and 2018, the Legislature and the Commission recognized the need for increased wildfire mitigation across California, requiring the state's electrical corporations to "invest in hardening of the state's electrical infrastructure and vegetation management to reduce the risk of catastrophic wildfire,"[10] and describe their efforts to mitigate wildfire risk and reduce the scale and scope of PSPS events in annual Wildfire Mitigation Plans and Updates.[11]

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[8] SDGE.com, *SDG&E's 2020-2022 Wildfire Mitigation Plan Update* (February 11, 2022) at 157, available at https://www.sdge.com/2022-wildfire-mitigation-plan.

[9] Strike Force Report at 5 (citation omitted).

[10] Assembly Bill (AB) 1054, Stats. 2019-2020, Ch. 79 (Cal. 2019) at Sec. 2.

[11] *See* Pub. Util. Code § 8386(c)(3).

SDG&E responded to California's call to action with large-scale infrastructure hardening efforts, including strategic undergrounding, expanded use of covered conductor, expanded situational awareness, increased inspections, and enhanced asset management. SDG&E has also leveraged stakeholder, community, and regulatory feedback to further refine and enhance programs to meet community and safety needs. Between 2007 and 2022, SDG&E has spent nearly $5 billion in overall wildfire mitigation and vegetation management efforts to protect the safety of its customers and communities, including development of some of the following programs and initiatives:

- The densest utility weather network in the nation with over 220 weather stations, fuel moisture sensors, and Normalized Difference Vegetation Index (NVDI) cameras in the HFTD.
- A leading meteorology department to monitor real-time potential fires in the territory and provide daily fire weather forecasts, which inform both PSPS preparedness as well as construction and work schedules. SDG&E's meteorology department also assists in development of SDG&E's weather models, including the Fire Potential Index (FPI) and the Santa Ana Wildfire Threat Index (SAWTI), developed to rate Santa Ana wind events. Both of these weather models benefit not only SDG&E but also inform community partners such as the United States Forest Service.
- Emergency response operations, including SDG&E's in-house team of fire coordinators who have built strong relationships with community first responders, fire suppression crews who are dispatched to support SDG&E operations, and aerial firefighting resources, including year-round operation of SDG&E's Air-Crane helitanker.
- A risk-informed approach to grid hardening, including an optimized combination of overhead system hardening, covered conductor, and strategic undergrounding based on SDG&E's Wildfire Next Generation System (WiNGS) Planning model and informed by SDG&E's technological and engineering expertise.

- Additional infrastructure enhancements to reduce risk, including advanced protection such as early fault detection and falling conductor protection, asset replacements, and operational protocols such as Sensitive Ground Fault Settings.
- Community engagement operations to support emergency and PSPS preparedness, informed by SDG&E's network of community partners and its Wildfire Safety Community Advisory Council, which includes members from SDG&E senior leadership and SDG&E's Board Safety Committee, as well as important community partners such as 211 San Diego and first responder agencies.
- Infrastructure enhancements and tools to mitigate PSPS impacts, including targeted installation of microgrids and generator grant programs to support customers and communities during periods of de-energization.
- Enhanced vegetation management operations, including pole brushing to mitigate the risk of an ignition spreading to nearby vegetation.[12]

SDG&E's comprehensive suite of wildfire mitigation efforts have not only served to promote public safety, but have also received approval from both the Commission and Energy Safety during the annual WMP process as meeting the requirements laid out by Senate Bill (SB) 901 and AB 1054. SDG&E was recently recognized by the Office of Energy Infrastructure Safety as having a "relatively strong Wildfire Mitigation Plan compared to the plans of the other large electrical corporations currently being evaluated. SDG&E knows its wildfire risk and is focused on the highest risk circuits on its system."[13]

My testimony describes SDG&E's Wildfire Mitigation Plan initiatives from 2019 through 2022 and discusses the direct costs associated with their implementation. The WMPs became effective in 2019, while SDG&E's Test Year 2019 decision was still pending with the Commission. Due to this timing, costs associated with many of SDG&E's WMP initiatives were

[12] The majority of SDG&E's vegetation management operations, including SDG&E's Wildfire Mitigation Plan (WMP) initiatives related to tree trimming, are recorded to SDG&E's Tree Trimming Balancing Account and are not the subject of SDG&E's Track 2 request. Vegetation management operations recorded to the WMPMA include fuels management and pole brushing costs.

[13] Office of Energy Infrastructure Safety, *Decision on SDG&E 2023-2025 Wildfire Mitigation Plan* (October 13, 2023) at 1.

not forecasted or authorized in its General Rate Case (GRC). SDG&E's authorized wildfire mitigation costs as well as incremental amounts incurred to implement new activities were tracked in SDG&E's Commission authorized Wildfire Mitigation Plan Memorandum Account, as further addressed in the testimony of Craig Gentes. The entirety of SDG&E's wildfire mitigation spending is just and reasonable to support public safety, the achievement of regulatory and legislative mandates, and promote safe and reliable electric service to SDG&E's customers. SDG&E's 2019 WMP, its 2020-2022 WMP, and each of its annual WMP updates in 2021 and 2022, including descriptions of the forecasted WMP costs, were approved by the Commission's Wildfire Safety Division and its successor, the Office of Energy Infrastructure Safety, and were ultimately ratified by the Commission. These investments have made the residents of SDG&E's service territory safer, reduced the impacts and use of PSPS, and demonstrably reduced risk. The Commission should approve recovery of SDG&E's incremental wildfire mitigation costs in full.

B. Organization of Testimony

For ease of comparison, my testimony follows the structure created by the Commission's Wildfire Safety Division and its successor, OEIS across the ten initiative categories of the 2020-2022 WMPs. All of SDG&E's wildfire mitigation initiatives serve to reduce either the risk of catastrophic wildfire or the impacts of PSPS. Within those risk reduction efforts there are two types of initiatives. First, some initiatives are foundational to monitor and understand wildfire or PSPS risk but do not directly reduce risk on their own. SDG&E's weather station network is one example of such an initiative. Other initiatives act to directly reduce the risk of ignition, the chance that an ignition will grow into a wildfire, or serve to mitigate the risks associated with PSPS. Grid hardening work, including undergrounding or electrical infrastructure and installation of covered conductor, are examples of initiatives that directly reduce ignition risk.

The table below provides the total direct costs of activities and accomplishments for each WMP category from 2019-2022 within the Wildfire Mitigation Plan Memo Account

(WMPMA).[14] The fully loaded costs tracked in the WMPMA are presented in the [Accounting] testimony of Craig Gentes.

Table JW-1: Overall Summary: 2019-2022 totals ($000)

Category	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
Risk Assessment and Mapping	$1,869	$1,824	-	-	$1,869	$1,824
Situational Awareness and Forecasting	$15,997	$11,442	$12,987	$9,588	$3,010	$1,854
Grid Design and System Hardening	$1,177,380	$73,363	$537,412	$21,302	$639,968	$52,060
Asset Management and Inspections	$139,338	$145,641	$45,105	$50,628	$94,233	$95,013
Vegetation Management and Inspections	-	$47,550	-	$16,552	-	$30,998
Grid Operations and Protocols	$33,452	$35,380	-	$36,177	$33,452	$(797)
Data Governance	$44,456	$1,321	-	$2,013	$44,456	$(692)
Resource Allocation Methodology	-	$13,198	-	$5,234	-	$7,964
Emergency Planning and Preparedness	$7,686	$42,203	$5,237	$7,732	$2,449	$34,472

[14] The revisions to my original Prepared Direct Testimony serve to reallocate costs between SDG&E's WMP categories and initiative level budget codes to align with the current data in SDG&E's accounting system. For instance, in my originally filed Prepared Direct Testimony, and Tables 3 and 4 of the Prepared Direct Testimony of Craig Gentes, SDG&E organized WMP-related budget codes into WMP activity categories based upon the categorization at the time of expenditure. As the WMP process continued to evolve under the direction of the Commission and the Office of Energy Infrastructure Safety, WMP categories changed over time and certain underlying activities were shifted between categories. While the activity itself did not change, it may have been presented in a different category of SDG&E's WMP from year to year. The revised tables in my testimony now organize the costs in the category as defined at the end of 2022 for ease of organization as well as alignment with the information in SDG&E's accounting system. The amount of SDG&E's request has not changed. Additionally, my Original Prepared Direct Testimony presented the full year 2019 costs associated with wildfire risk mitigation activities. The amounts attributed to 1/1/2019 to 5/29/2019 were removed by Mr. Gentes in his original Prepared Direct Testimony to reflect SDG&E's incremental WMPMA balance. This revised testimony now includes only amounts incurred from 5/30/2019 to 12/31/2022 to reflect only costs recorded to SDG&E's WMPMA.

Stakeholder Cooperation and Community Engagement	$15,809	$33,765	-	$1,096	$15,809	$32,669
Total	**$1,435,987**	**$405,688**	**$600,740**	**$150,322**	**$835,247**	**$255,366**

II. SDG&E'S COMPREHENSIVE APPROACH TO WILDFIRE MITIGATION HAS ESTABLISHED THE COMPANY AS A WORLDWIDE EXAMPLE

A. SDG&E's Early Wildfire Mitigation Efforts and Development of the Wildfire Mitigation Plans

The safety of SDG&E's customers, employees, and communities are the company's top priority. And virtually no activity implicates safety more than SDG&E's efforts to mitigate the risk of catastrophic utility-related wildfires. SDG&E's service territory experiences a number of conditions conducive to wildfire, including the Santa Ana winds that have been directly linked to some of the largest and most destructive wildfires in Southern California. These Santa Ana winds, coupled with other weather conditions and dry fuels present an increased risk of catastrophic wildfires.[15] Further, as California continues to experience and understand the increasing effects of climate change, SDG&E's "fire season" continues to evolve—while the highest risk Santa Ana winds are still most prevalent during the late summer and early fall, wildfire conditions exacerbated by conditions such as persistent drought and extreme heat events can now be present almost year-round.

Southern California is no stranger to wildfire risk. In 1970, the Laguna Fire burned over 175,000 acres during Santa Ana wind conditions, destroying over 400 homes in eastern San Diego County.[16] This year marks the 20th anniversary of the Cedar Fire, which destroyed over 270,000

[15] The Commission recognized specific areas of SDG&E's service territory at an even higher risk of fire in D.17-12-024, which established the HFTD. Approximately 64% of SDG&E's service territory is within the HFTD, where there is an increased potential for wildfires.

[16] San Diego Union Tribune, *San Diego Was On Fire 50 Years Ago, Too*, (August 30, 2020) available at https://www.sandiegouniontribune.com/news/public-safety/story/2020-08-30/california-fires-1970-legacy.

acres and nearly 3,000 buildings, and killed 15 people.[17] In October 2007, power lines were related to several fires across California, including the Rice and Witch/Guejito Fires, which combined burned over 200,000 acres, destroyed 1,141 homes, caused two fatalities.[18] The 2007 conflagration across Southern California burned more than 780 square miles, killed 17 people, destroyed thousands of homes and buildings, and resulted in hundreds of thousands of people being evacuated.[19] The testimony of Thom Porter further discusses San Diego's fire history and the risks associated with the Company's service territory.

The devastation of these events left SDG&E on notice of the risks associated with ignitions that could result from utility infrastructure.[20] In the aftermath of the catastrophic 2007 fires, SDG&E dedicated itself to revamping and enhancing its wildfire prevention and mitigation measures across a wide spectrum of disciplines and activities. Many of those initiatives were undertaken without any precedent or road map for SDG&E to follow. Drawing on its culture of innovation and improvement, SDG&E developed a wildfire mitigation program targeted at better understanding meteorology, fire science, and ignition reduction tools and infrastructure. SDG&E pioneered the use of Public Safety Power Shutoffs as a last resort tool to protect communities facing the highest risk conditions during extreme weather events. And SDG&E led the way in wildfire risk assessment to better understand investment prioritization and hone the use of Public Safety Power Shutoffs to limit their impacts. The company looked outside the traditional utility sphere to draw upon partnerships with academia, science, and first responders to leverage external

[17] City of San Diego, *2003 Cedar Fire*, available at https://www.sandiego.gov/fire/about/majorfires/2003cedar.

[18] D.17-11-033 at 14.

[19] D.12-01-032 at 5.

[20] The Commission has determined that ignitions that were not utility-related, such as the 2003 Cedar Fire, should also be considered when assessing potential fire risk. *See* D.17-11-033 at Conclusion of Law 12.

knowledge and expertise. Upon this foundation, SDG&E has established itself as a leader in wildfire mitigation efforts for more than a decade.

Climate change has continued to present additional wildfire risk conditions. After the catastrophic fires throughout California in 2017 and 2018, the state legislature enacted SB 901, which, among other things, established the requirement for electric utilities to submit annual Wildfire Mitigation Plans.[21] More recently, on July 11, 2019,[22] the California State Legislature passed an additional bill to address the growing risk of wildfires and ensure that electrical corporations had access to the investment capital necessary to implement large-scale improvements to statewide wildfire mitigation and system hardening. AB 1054, which was signed into law by Governor Newsom on July 12, 2019, became effective immediately. In AB 1054, the California Legislature stated that "[t]he increased risk of catastrophic wildfires poses an immediate threat to communities and properties throughout the state."[23] The Legislature further directed that "[t]he state has dramatically increased investment in wildfire prevention and response, which must be matched by increased efforts of the electrical corporations,"[24] and "[t]he state's electrical corporations must invest in hardening of the state's electrical infrastructure and vegetation management to reduce the risk of catastrophic wildfire."[25] Electrical corporations must also discuss their efforts to "reduce the need for, and impact of" PSPS on frequently de-energized circuits through "replacing, hardening, or undergrounding" of upstream lines.[26]

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[21] The initial requirement to submit annual wildfire mitigation plans was set forth in SB 901, Pub. Util. Code § 8386(b). This Pub. Util Code section was subsequently amended by AB 1054.

[22] AB 1054, Stats. 2019-2020, Ch. 79 (Cal. 2019).

[23] *Id*. at Section 1(a)(1).

[24] *Id*. at Section 2(a).

[25] *Id*. at Section 2(b).

[26] Pub. Util. Code § 8386(c)(8).

After the passage of SB 901, the Commission approved SDG&E's first WMP submission, finding that SDG&E's already existing efforts and additional planned future measures met the requirements of Pub. Util. Code Section 8386(c). SDG&E's initial 2019 WMP addressed both the already existing wildfire mitigation efforts at the Company, as well as improvements and enhancements to existing programs to meet the state's wildfire mitigation objectives.[27] The 2019 WMP addressed an overarching strategy to develop:

> [p]rocesses and programs to understand wildfire risk, conditions, and behaviors to provide the Company and its customers with time and information to take appropriate action; build, construct, and operate a fire-hardened electric distribution and transmission system in a manner that minimizes the possibility of igniting a fire; educate customers and stakeholders on wildfire risk; and support customers affected by outages.[28]

SDG&E further acknowledged that the 2019 WMP and implementation strategies need to be flexible to adapt to changing circumstances, weather, funding, and variables yet to be known.[29]

After the 2019 WMP was submitted, the Legislature modified the WMP process and requirements in AB 1054, including a new three-year WMP cycle. Consistent with Commission direction,[30] SDG&E filed its initial three-year comprehensive WMP in 2020. The 2020 WMP included additional detail on the Plan, organized in the structure required by the Commission. And since 2020, the Commission—and the successor to the Commission's Wildfire Safety Division,

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[27] San Diego Gas & Electric Company, *2019 Wildfire Mitigation Plan* (February 6, 2019) (2019 WMP) available at https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M263/K673/263673421.PDF. SDG&E's 2019-2023 WMPs and Annual Updates are incorporated into my testimony as Appendices A-E, and provided with the service of my testimony.

[28] *Id.* at 6.

[29] *Id*. at 2.

[30] Rulemaking (R.) 18-10-007, Administrative Law Judge's Ruling on Wildfire Mitigation Plan Templates and Related Material and Allowing Comment, Attachment 1 – WMP Guidelines (issued December 16, 2019), as clarified by the Wildfire Safety Division (WSD) on January 15, 2020 and January 27, 2020.

Energy Safety—have continued the "iterative"[31] process to further develop wildfire mitigation requirements, as well as the regulatory process regarding "reporting, monitoring, evaluation and updating to ensure the electrical corporations are targeting the greatest risk with effective programs."[32] SDG&E received approval of its 2019, 2020, 2021, and 2022 WMP submissions, which are incorporated by reference to my testimony and attached as appendicies.[33]

SDG&E's 2023-2025 Wildfire Mitigation Plan was approved on October 13, 2023 and describes its forward-looking projections for wildfire mitigation initiatives for both a three and 10-year basis. While my testimony in this Track of this proceeding supports the reasonableness of SDG&E's 2019-2022 wildfire mitigation expenditures, Energy Safety recognized the arc of SDG&E's progress in wildfire mitigation:

> SDG&E knows its wildfire risk and is focused on the highest risk circuits on its system. In particular, it is relatively strong in its vegetation management, situational awareness, emergency preparedness, and community outreach and engagement. Regarding vegetation management, SDG&E has the lowest number of vegetation-caused ignitions and outages per 10,000 overhead circuit miles among the large electrical corporations [ ]. Regarding situational awareness, SDG&E has a relatively dense weather station network, with all of the stations able to station report wind speed, wind gust, wind direction, temperature, and humidity every 10 minutes and most of the stations able to report these indicators every 30 seconds if needed. SDG&E is able to usepast data to train its artificial intelligence forecasting system, which is now integrated into most of its stations. Regarding emergency preparedness, SDG&E is working toward accreditation through the Emergency Management Accreditation Program. Regarding community outreach and

[31] Resolution WSD-002, Guidance Resolution on 2020 Wildfire Mitigation Plans Pursuant to Public Utilities Code Section 8386 (June 11, 2020) at 8.(citing D.19-05-036 at 36), available at https://www.cpuc.ca.gov/industries-and-topics/wildfires/wildfire-related-resolutions.

[32] *Id.*

[33] D.19-05-039 (approving SDG&E's 2019 WMP Submission); Resolution WSD-005, Resolution Ratifying Action of the Wildfire Safety Division on San Diego Gas & Electric Company's 2020 Wildfire Mitigation Plan Pursuant to Public Utilities Code Section 8386, (June 11, 2020) (ratifying WSD's approval of SDG&E's 2020 WMP); Resolution WSD-019, Resolution Ratifying Action of the Wildfire Safety Division on San Diego Gas & Electric's 2021 Wildfire Mitigation Plan Update Pursuant to Public Utilities Code Section 8386. (July 20, 2021) (ratifying Energy Safety's approval of SDG&E's 2021 WMP); Resolution SPD-1, Resolution Ratifying Action of the Office of Energy Infrastructure Safety on San Diego Gas & Electric Company's 2022 Wildfire Mitigation Plan Update Pursuant to Public Utilities Code Section 8386 (August 25, 2022) (ratifying Energy Safety's approval of SDG&E's 2022 WMP), available at https://www.cpuc.ca.gov/industries-and-topics/wildfires/wildfire-related-resolutions.

> engagement, SDG&E is developing a Wildfire and Climate Resiliency Center where it will conduct staff and partner training and outreach activities. Additionally, SDG&E has created a role in its Emergency Operations Center dedicated to liaising with its customers with access and functional needs.[34]

These recognitions would not be possible without the investments that SDG&E has already made in its system, including its wildfire mitigation work from 2019-2022.

And those investments have shown demonstrable success in risk reduction, improvements in customer safety, improvements in customer emergency preparedness, and reduced PSPS impacts. SDG&E has not experienced a significant utility-caused wildfire since 2007. Without SDG&E's early investments in wildfire mitigation, given the fire conditions present from 2017-2020 throughout the state, the SDG&E service territory could have easily experienced a catastrophic utility-related fire similar to those that occurred elsewhere in the state. The Commission's expert analysis of the 2019 PSPS events, conducted by fire modeling expert Technosylva, concluded that SDG&E's use of de-energization likely resulted in significant wildfire risk reduction.[35] SDG&E's overall success to date in wildfire reduction merits a finding that its incremental 2019-2022 wildfire mitigation costs are just and reasonable.

B. SDG&E's Wildfire Mitigation Approach Is Thoughtful and Risk Based

After the 2007 wildfires, the risks associated with SDG&E's transmission system became apparent and were addressed by traditional hardening beginning in 2009. The "grave and ongoing risk that Santa Ana windstorms will cause catastrophic power-line fires"[36] necessitated preparation and immediate risk reduction through both additional inspections and maintenance as well as hardening of infrastructure. SDG&E also began traditional hardening of its distribution system in

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[34] Office of Energy Infrastructure Safety, *Decision on SDG&E 2023-2025 Wildfire Mitigation Plan* (October 13, 2023) at 1.

[35] CPUC, *2019 PSPS Event – Wildfire Analysis Report for SDG&E; Technosylva, Inc*. (July 9, 2021) available at https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/safety-and-enforcement-division/documents/technosylva-report-on-sdge-psps-events-2019.pdf.

[36] D.12-01-032 at Finding of Fact 3.

2013. But it was important for SDG&E to better understand the risks associated with its system to better prioritize work and investment. SDG&E supported the development of additional fire prevention plans to reduce the risk of catastrophic power line fires as early as 2012, and also led in the creation of the High Fire Threat Districts, which incorporated the fire hazards associated with historical power-line fires.[37]

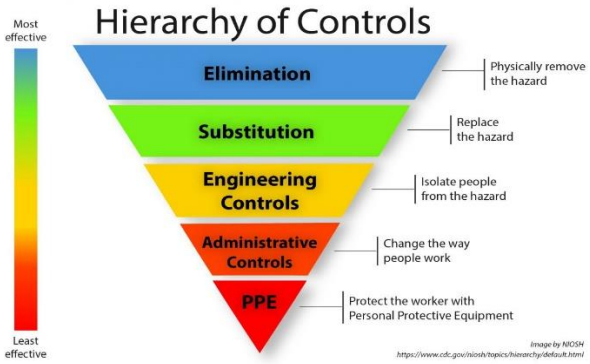
In addition to its support of these regulatory efforts, SDG&E first worked with Technosylva to develop the Wildfire Risk Reduction Model (WRRM) in 2013 prior to the introduction of any regulatory requirements for risk modeling. The WRRM model provided the methodology to prioritize spans of high-risk wires for replacement and informed SDG&E's early scoping for covered conductor and undergrounding work. In addition, the company performed a wind study based on weather information available at the time to change the design standards for the grid from designing for 56 mph winds to 65 mph, 85 mph, and 111 mph winds. Combined with our situational awareness, the WRRM prioritization, and the wind study, SDG&E's initial grid hardening efforts reduced wildfire risk in the HFTD.

These initial efforts, while important, can be characterized as an early process to mitigate wildfire risk through various programs which could be considered near the bottom middle of the well-known hierarchy of controls, illustrated below in Figure 1. Bare wire hardening and asset replacement, acting alone, reduced risk, but it does not remove or replace the hazard of ignition. During this time period, SDG&E's primary initiative to reduce the risk of wildfire was de-energization of power lines. PSPS in this form is subject to additional risks, namely human error in the selection of lines for de-energization and the re-energization process, in addition to the obvious customer and financial risks associated with sustained loss of power. Because of these

[37] D.17-12-024 at 8.

risks, SDG&E did not consider this a long-term, sustainable approach consistent with the mandates of the Wildfire Legislation.

Figure JW-1



Wildfire risk mitigation leverages a hierarchy of controls similar to that used for mitigating safety risk. Where possible, SDG&E seeks to eliminate risk, which leads to more sustained controls such as undergrounding. Since SDG&E's ability to underground assets is constrained by cost limitations, SDG&E aims to replace the hazard through efforts such as replacing grid assets or engineering controls such as inspections and monitoring.

As the need to reduce the scale, scope, and frequency of PSPS became increasingly apparent, SDG&E saw reason to shift to more permanent risk reduction efforts, including grid hardening tools such as implementation of covered conductor and strategic undergrounding of lines facing the highest risk. SDG&E is continuing to increase the mix of mitigations to eliminate wildfire risk and lessen the use of last resort controls such as PSPS.

Understanding that these infrastructure investments would pose significant costs and the need to balance safety with customer affordability impacts, SDG&E developed its Wildfire Next Generation System Model (WiNGS), which enables risk assessment and further prioritization of distribution grid hardening based on both an assessment of SDG&E's overall system risk and the risk of the specific circuit segment under analysis. WiNGS' systemwide risk assessment is built upon the RSE methodology adopted in SDG&E's Risk Assessment Mitigation Phase (RAMP),

and the model also allows for risk analysis at the portfolio level. By aggregating all the segment risks and mitigations to arrive at an overall risk reduction result, this dual look approach allows for a better understanding of the cost and benefit of the investments as compared to just a segment level view. If the analysis is limited to the segment alone, it is possible that SDG&E would not be able to achieve a balanced scale of risk reduction across the service territory. With the WiNGS model SDG&E has better capabilities to analyze wildfire risk and, by extension, PSPS risk.

SDG&E's risk models are subject to ongoing evolution based on continually updated and new data, technology enhancements, stakeholder feedback, and regulatory direction. Energy Safety facilitates a risk assessment working group tailored at driving risk modeling innovations and challenging the state's electrical corporations to explore additional technologies and analysis. Additionally, SDG&E has sought out independent review of its models for validation and seeking opportunities for improvement.

SDG&E embraces these opportunities for enhancement, but it is also important to avoid the paralysis of action and delayed risk reduction that could occur if the company waited for the "perfect" risk model before taking action. The evolving risk of wildfire and the changing climate demand action in the near term. SDG&E has prioritized its grid hardening strategies in several ways since the WMPs were created. First, SDG&E targeted spans of the highest risk small bare wire for immediate replacement during initial traditional hardening. As SDG&E has increasingly turned to covered conductor and strategic undergrounding, SDG&E has leveraged its risk models to target the highest risk circuit segments in its territory first—achieving rapid wildfire and PSPS risk reduction. This process supports SDG&E's "least regrets" approach to wildfire risk reduction. As further discussed below, as the company sees improving cost efficiencies and benefits of undergrounding—which undeniably results in the highest long-term wildfire and PSPS risk reduction—SDG&E's models continue to indicate the use of strategic undergrounding and reasonable RSE's for undergrounding of SDG&E's highest risk circuits. SDG&E has relied on its

vetted models and subject matter expertise in selecting circuits for undergrounding because this approach is the least likely to result in the need to revisit or redo work in the future.

C. SDG&E's Process for Recording WMP Costs

While SDG&E had an existing wildfire mitigation program prior to the passage of the Wildfire Legislation, many of its WMP initiatives were unanticipated in its Test Year 2019 General Rate Case. As authorized by AB 1054, SDG&E established its Wildfire Mitigation Plan Memorandum Account (WMPMA) to record costs associated with implementing approved WMP initiatives. The WMPMA allowed SDG&E the flexibility to implement actions necessary to reduce risk in an efficient and expedited manner, without needing to wait for approval through the GRC process. This was particularly important for SDG&E, as the company's TY 2019 rate case was submitted and litigated in 2017 and 2018, without an understanding of the requirements that would result from the Wildfire Legislation and the widely recognized need for additional risk reduction. My testimony discusses the "direct" costs of SDG&E's wildfire mitigation activities. SDG&E's establishment of the WMPMA, the account process used to record wildfire costs, controls to assess incrementality, and the loading of SDG&E's direct costs to calculate the requested revenue requirement, are all addressed in the testimony of Craig Gentes.

While this process provides the final venue for a reasonableness review of costs recorded to its WMPMA, the costs associated with SDG&E's WMP have been continually subject to ongoing review and transparency through various processes at the Commission and Energy Safety. SDG&E provides annual spend projections for each WMP initiative in its annual WMP Update, and its WMP distribution actual expenditures are reported quarterly and annually to Energy Safety and the Commission through its Quarterly Data Reporting and Quarterly Notification Letters established by Pub. Util. Code Section 8389.

Additionally, the Legislature required that in overseeing compliance with the electrical corporations' WMPs, Energy Safety (and before that the Commission's Wildfire Safety Division)

must assess and determine whether "the electrical corporation failed to fund any activities included in its plan."[38] SDG&E is required to provide "[d]escriptions of all planned WMP initiative spend vs actual WMP initiative spend and an explanation of any differentials between the planned and actual spends" in its Annual Report on Compliance.[39] Underspending of forecasted initiatives may result in a finding of non-compliance and potential fines.[40]

III. SDG&E'S 2019-2022 WMP COSTS ARE JUST AND REASONABLE

A. Risk Assessment and Mapping

The aim of SDG&E's risk assessment effort is to quantify the risk of wildfire and the impacts of PSPS events more effectively to identify optimal solutions that target risk reduction of both elements across the system. Working with Technosylva and others, SDG&E has implemented innovative approaches to leverage these models for the evaluation of hardening projects and for the safe operation of the system. Proposed grid hardening projects and emergency actions are also evaluated and prioritized from the standpoint of reducing or eliminating fire risk potential from overhead electric facilities and reducing the impact of PSPS to customers.

1. Summarized Risk Map

Year	Units	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	n/a	$3	-	-	-	$3	-
2020	n/a	$343	-	-	-	$343	-
2021	n/a	$38	$5	-	-	$38	$5
2022	n/a	$1,486	$1,819	-	-	$1,486	$1,819
Total	**n/a**	**$1,869**	**$1,824**	**-**	**-**	**$1,869**	**$1,824**

2. Initiative Description

Without sufficient awareness, it is difficult to target long-term system hardening efforts to the areas of greatest wildfire risk. This awareness also aids in identifying the risk and impacts of

[38] Pub. Util. Code § 8386.3(c)(2)(B)(i).

[39] CPUC, *Wildfire Safety Division – Compliance Operational Protocols*, (February 16, 2021) at 10 (Appendix F).

[40] *See* Pub. Util. Code § 8386(c)(2)(B)(i).

potential fires of consequence that could occur in the service territory, which requires sufficient data.

As part of the Summarized Risk Map initiative, SDG&E has developed several models to enhance awareness of the risk of wildfire and PSPS within the service territory and aid in the selection and prioritization of grid hardening initiatives.

a. Wildfire Risk Reduction Model (WRRM) and WRRM-Ops

The WRRM model was developed in collaboration with fire behavior experts and leverages 30 years of high-resolution weather data to establish climate scenarios and failure rates of SDG&E's assets, establish risk maps showing the overall ignition probability, and estimate wildfire consequence along electric lines and equipment. This model was further enhanced into an operational system, WRRM-Ops, by developing a fully-automated process to ingest daily weather and fuel moisture data and to re-calculate risk levels to support emergency operations.

Subject matter experts, including fire coordinators and fire scientists, analyze the model's performance for all wildfires on the landscape, identifying deviations from the risk and propagation modeling. These findings drive future development of the model and will result in more specific quantifiable outcomes, allowing for better decision making in the overall hardening effort.

b. Wildfire Next Generation System (WiNGS)-Planning and WiNGS-Ops

The WiNGS-Planning model was developed to aid with the allocation of grid hardening initiatives across HFTD segments based on an assessment of both wildfire risk and PSPS impacts. WiNGS-Planning is built upon the Multi-Attribute Value Framework (MAVF) framework in the RAMP and evaluates both wildfire and PSPS impacts at the sub-circuit/segment level. Information is used to inform investment decisions by determining and prioritizing mitigation based on Risk Spend Efficiency (RSE), improving wildfire safety, and limiting the impact of PSPS on customers. Additionally, the WiNGS-Ops model, a real-time risk assessment model, helps quantify the wildfire risk and PSPS risk in real-time as a function of wind and provides a range of wind gusts where the fire risk is likely greater than the PSPS risk based on a wind curve. This information provides an additional data point for consideration during PSPS events.

c. Probability of Ignition (PoI)

In 2021, more granular PoI models at the asset and ignition source level were developed in collaboration with SDG&E's Fire Science and Climate Adaptation (FSCA) department and Technosylva, who helped gather data on significant ignitions, ignition sources, and weather. These models capture the ignition risk associated with specific ignition drivers, including conductor failure, vegetation contact, balloon contact, vehicle contact, and animal contact. The PoI models are built upon outputs from two separate models, Probability of Failure (PoF) and conditional probability model (PoIF). The PoI models also take into account failure-related data sets to compute the component PoF model, such as outage history and equipment failures. The models are developed at the span level and are additionally aggregated to the segment/sub-circuit level for available analysis at multiple levels of granularity. This level of granularity will provide an understanding of the different ignition risk drivers, assisting in the selection of mitigation measures and effective operational decision making.

3. Initiative Impact

WRRM was the first project-scoping tool used to prioritize electric distribution fire hardening for SDG&E's Distribution Overhead Hardening Programs. WRRM combines electric distribution asset data and wildfire simulations to predict the risk of potential equipment-related ignitions. To accomplish this, Technosylva aggregated millions of wildfire computer simulations to build a geospatial layer of wildfire vulnerability over the electric distribution overhead assets. This layer, combined with the assets' expected failure and ignition rates, was used to assign a wildfire risk score. The wildfire risk score, called the expected impact, was also generated for assets considered hardened by SDG&E construction standards. These hardened assets have reduced failure and ignition rates. The difference in risk scores between assets provided a risk reduction score used to prioritize circuits and sections for projects inside the Distribution Overhead Hardening program.

Further refinement of fire modeling technologies, geospatial data, and computer capabilities allowed WRRM to evolve into WRRM-Ops, a tool with more granular fire weather forecasting instead of a single aggregated simulation model. The previous iteration of WRRM is also utilized in the WiNGS-Planning model to help characterize sub-circuit fire consequence and the latest WRRM and WRRM-Ops models are currently utilized as tools to understand the consequence of ignitions at different locations as the latest PoI models are incorporated to evaluate likelihood of risk. WiNGS-Planning will now inform investment decisions in 2023 and beyond when recommending a grid hardening mitigation for a specific circuit segment.

B. Situational Awareness and Forecasting

Situational Awareness and Forecasting: 2019-2022 totals ($000)						
Initiative	**Actual Capital**	**Actual O&M**	**Authorized Capital**	**Authorized O&M**	**Differential Capital**	**Differential O&M**
Advanced Weather Monitoring and Weather Stations	$2,539	-	$2,769-	-	$(229)	-
Air Quality Index	-	-	-	-	-	-
Camera Network	$9	-	-	-	$9	-

Situational Awareness and Forecasting: 2019-2022 totals ($000)						
Initiative	**Actual Capital**	**Actual O&M**	**Authorized Capital**	**Authorized O&M**	**Differential Capital**	**Differential O&M**
Wireless Fault Indicators	$3,670	-	$10,218	-	$(6,548)	-
Fire Science and Climate Adaptation Department	-	$11,442	-	$9,588	-	$1,854
Fire Potential Index	$4,539	-	-	-	$4,539	-
High Performance Computing Infrastructure	$5,240	-	-	-	$5,240	-
Total	**$15,997**	**$11,442**	**$12,987**	**$9,588**	**$3,010**	**$1,854**

SDG&E's FSCA business unit was established in 2018, and is comprised of meteorologists, community resiliency experts, fire coordinators, and project management personnel. Its purpose is responding to and strategizing for wildfire preparedness activities and climate resilience-related programs. Many of the initiatives in the Situational Awareness and Forecasting category were implemented to enable the FSCA unit to effectively conduct wildfire response and preparedness activities.

The Weather Station Network increases situational awareness and obtains foundational data for operational and mission critical activities. Situational awareness tools such as weather stations, cameras, the Fire Potential Index (FPI), and the Santa Ana Wildfire Threat Index (SAWTI) are utilized to forecast weather across the service territory. The Weather Station Network provides information on the location and severity of weather events that may impact the system. High-performance computing clusters generate high-quality weather data that is incorporated directly into operations. To ensure ignitions do not go unnoticed, satellite-based ignition detections are coupled with a mountain top camera network.

The FPI model was developed to calculate the wildfire potential on any given day, assisting in safe and reliable operations. It establishes daily operating conditions (*i.e.*, Normal, Elevated, Extreme), which inform operational decisions such as recloser settings, restrictions on the type of work being performed in high-risk locations, and the use of contract fire resources (CFRs). It is also used as an input for PSPS decision making.

C. Advanced Weather Monitoring and Weather Stations

Year	Units (weather stations)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	13	$559	-	$1,111	-	$(552)	-
2020	30	$1,040	-	$536	-	$504	-
2021	46	$399	-	$554	-	$(155)	-
2022	50	$542	-	$568	-	$27	-
Total	**139**	**$2,539**	**-**	**$2,769**	**-**	**$(229)**	**-**

1. Initiative Description

The Weather Station Network, comprised of 222 weather stations, increases situational awareness and obtains foundational data for operational and mission critical activities. Existing weather stations continue to be replaced and/or updated to improve weather data and ultimately provide more accurate forecasting. When developing the Weather Station Network, the alternative of using pre-existing weather stations was considered, however, the existing data generated did not have the resolution needed to support emergency operations during PSPS events. Weather stations in the network record wind speed, wind direction, wind gusts, temperature and humidity every 10 minutes and transmit the data to our publicly available website.

SDG&E owns and operates a dense network of 222 weather stations in a 4,000-square-mile service territory. Each station reports wind speed/gust/direction, temperature, and humidity every 10 minutes via cellular and spread spectrum communications, totaling over 30,000 observations per day. In addition, 95 percent of the weather stations can report every 30 seconds if needed during dangerous fire weather conditions. This additional data demonstrated that in many cases high wind gusts were brief and isolated in nature such that de-energizations were not necessary, decreasing the total customers impacted by PSPS events during weather events. The collection of 30,000 daily observations over the last 10 years has enabled statistical analysis for targeted electrical shut offs, as necessary. Historical observations are also used to update the relevant wind impact guidance, such as two standard deviations from the mean (95th percentile) and three standard deviations from the mean (99th Percentile), on an annual basis.

In 2022, SDG&E expanded upon the lessons learned in 2021 and integrated its AI forecasting system across 216 weather stations, providing the latest available forecasting technology to help serve communities in the highest risk fire areas. The ability to implement this technology stems from recording weather observations every 10 minutes for over 10 years, collecting one billion observations that are available to be used in training AI. Additionally, as more data is collected each year, more can be integrated back into the forecasting system to improve the model. These new predictive technology models help increase the accuracy of weather forecasts, which are shared with the public and fire agencies.

2. Initiative Impact

Weather events have the potential to cause damage to electrical infrastructure which may lead to faults or ignitions within the service territory. Understanding the location and severity of weather events that may impact SDG&E's system is critical for planning grid hardening activities and responding to real-time events that may lead to PSPS. SDG&E's weather network provides the situational awareness and foundational data required for operational activities.

D. Air Quality Index

Year	Units (sensors)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-
2021	-	-	-	-	-	-	-
2022	8	-	-	-	-	-	-
Total	**8**	-	-	-	-	-	-

1. Initiative Description

Particulates contained in wildfire smoke are hazardous to employees and the public. In addition, the Division of Occupational Safety and Health Protection from Wildfire Smoke Program (California Code of Regulations Title 8 Section 5141.1) requires employers to notify employees and implement control measures when the Air Quality Index (AQI) for Particulate Matter 2.5 microns or smaller in diameter (PM2.5) exceeds 150 or exceeds 500 during wildfires.

In 2022, the Air Quality Management Program installed particulate sensors at nine locations and a partially automatic notification system. Through this system, the AQI for PM2.5 is measured and reported for each location. The AQI is a tool developed by the EPA used to communicate air quality. While the EPA monitors and reports on multiple air pollutants, the Air Quality Management Program focuses on PM2.5 which is fine particulate matter measured at 2.5 microns or less. Causes of high levels of PM2.5 include vehicle exhaust, sources such as power plants, and the burning of fuels such as wood, coal, or heating oil. The concentration of PM2.5 can increase significantly during a wildfire. Particulate sensors measure the levels of PM2.5 and when thresholds are exceeded, Safety is automatically notified. Once the particulate source has been confirmed to be a wildfire, notifications with AQI information are sent to supervisors via text and email.

2. Initiative Impact

The AQI program provides real-time AQI values for an increasing number of areas above what has been historically provided by San Diego County and the Environmental Protection Agency. These values are required to notify employees and the public of the presence of poor air quality allowing time to take the proper precautions to maintain safety.

E. Camera Network

Year	Units (cameras)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	-	$6	-	-	-	$6	-
2020	-	-	-	-	-	-	-
2021	-	-	-	-	-	-	-
2022	12	$3	-	-	-	$3	-
Total	**12**	**$9**	**-**	**-**	**-**	**$9**	**-**

1. Initiative Description

The robust camera network of over 130 mountain-top cameras enables near real-time reporting of fire ignitions in the service territory. This network of cameras is built on the backbone High Performance Wireless Research and Education Network (HPWREN), in partnership with the University of California San Diego and local fire departments. Images from the mountain-top camera network are relayed via Federal Communications Commission (FCC)-licensed radio spectrum to a publicly available web-based platform. Forty-three of the 130 cameras are known as Pan-Tilt-Zoom (PTZ) cameras with remote access for limited SDG&E personnel and local fire agency personnel to aid in the triangulation of ignitions or areas of interest.

Cameras are strategically located on mountaintops with optimal viewsheds to mountainous areas of dense brush and chaparral but due to their advanced capabilities, these locations also provide excellent vantage points into not only the HFTD but some wildland urban interface (WUI) areas and other urban areas. The cameras are physically located throughout the entire service territory.

SDG&E provides funding to the HPWREN user group for camera maintenance and installation but does not own the assets. The maintenance funding ensures redundant feeds for all cameras such that if a feed is lost through the Alert California website, backup imagery is available through the HPWREN-dedicated website. In addition, backend communication pathways are comprised of a multi-point radio system thereby providing redundant pathways for relaying camera imagery. In 2022, portions of SDG&E's maintenance funding were dedicated to adding redundancy to ensure the resiliency of the mountain-top network.

2. Initiative Impact

Cameras provide visual confirmation of reported ignitions or areas of concern and are used as an additional data point in enhancing situational awareness. The cameras can assist first responders with this additional data to improve the response to any ignitions in the service territory, potentially improving the initial attack and limiting the impact of ignitions.

F. Wireless Fault Indicators

Year	Units (Wireless Fault Indicators)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	594	$794	-	$4,884	-	$(4,090)	-
2020	502	$863	-	$1,726	-	$(863)	-
2021	544	$1,131	-	$1,781	-	$(650)	-
2022	595	$883	-	$1,827	-	$(945)	-
Total	**2,235**	**$3,670**	**-**	**$10,218**	**-**	**$(6,548)**	**-**

1. Initiative Description

Wireless Fault Indicator (WFI) devices are used to monitor electricity distribution lines and locate faults more efficiently and accurately using Low Power Communication Network (LPCN) communication to alert distribution system operators where a fault on any line or circuit occurred. WFIs can detect faults without having a minimum continuous current on the line, allowing the installation of remote locations that have very little load. Distribution operators can then dispatch electric troubleshooters close to the exact fault location to identify and isolate the fault and begin service restoration quickly. During a time of heightened wildfire risk, all infrastructure is patrolled for damage prior to restoring power. In instances where large areas are de-energized, WFIs are used to concentrate focus on a smaller portion of the electric circuit, which allows for a faster response in the event of an ignition; a greater chance of determining and correcting a fault cause when damage on the overhead electric system is not immediately obvious; and potentially faster power restoration improving reliability for customers.

2. Initiative Impact

WFIs assist with reducing the restoration time when responding to outages. The WFIs will allow for first responders to gain additional information into the location of the fault, saving time on initial patrols used to locate the cause of the outage. To calculate this benefit, the average duration and customer impact was calculated for HFTD outages. The installation of WFIs was assumed, by subject matter experts (SMEs), to reduce the duration of an outage by 10 minutes. Customer minutes were calculated using the 10-minute reduction per outage. Customer minutes

are then converted to System Average Interruption Duration Index (SAIDI) and the savings were calculated. The total SAIDI benefit of WFIs for the 2019-2022 timeframe is estimated as 5.7 SAIDI minutes.

Risk Reduction Estimation for the WFI Program	
Duration per Outage prior mitigation (Minutes)	504
Numbers of Customers per Outage	396
Customer Minutes prior to mitigation	99,911
Total Numbers of Customers	1,478,587
Average SAIDI Prior to Mitigation	0.0676
Outage Duration Reduction through Mitigation (Minutes)	10
Duration per Outage after Mitigation (Minutes)	494
Customer Minutes after Mitigation	95,949
Average SAIDI after Mitigation	0.0649
Circuits HFTD	194
Circuits planned for WFIs (2020-2022) HFTD	194
SAIDI Reduction per Outage	194/194*(0.0676-0.0649)=0.0027
Total SAIDI Reduction 2019-2022	2122*0.0027=5.7

G. Fire Science and Climate Adaptation Department

Year	Units	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	n/a	-	$1,461	-	$2,373	-	$(912)
2020	n/a	-	$3,414	-	$2,436	-	$978
2021	n/a	-	$2,840	-	$2,435	-	$405
2022	n/a	-	$3,726	-	$2,343	-	$1,383
Total	**n/a**	**-**	**$11,442**	**-**	**$9,588**	**-**	**$1,854**

1. Initiative Description

This initiative addresses understanding of wildfire risk and impacts of climate change on the risk. In the years prior to 2018, there was growing evidence that changing climate conditions were contributing to an increase in wildfire potential throughout California. As a result, SDG&E established a FSCA department in 2018, which continues to expand and grow to meet the needs of

increasing wildfire and climate-related risks. The department is comprised of meteorologists, community resiliency experts, fire coordinators, and project management personnel. This department's purpose is responding to and strategizing for SDG&E's fire preparedness activities and programs.

One of the programs managed by the FSCA department is the Ignition Management program. The purpose of the Ignition Management program is to track and perform root cause analyses on ignitions and potential ignitions to detect patterns or correlations. When patterns or correlations are identified, the outcomes are communicated and assigned to mitigation owners from the business unit most logically positioned to eliminate or reduce future events of a similar nature. The value of this program is in understanding and preventing ignitions. The ignition management program has enabled SDG&E to gather focused data on near ignition events and analysis of this data has helped educate fire prevention decisions.

In addition to providing SDG&E with subject matter expertise in meteorology, wildland fire coordination and response, and community resiliency, this department has developed academic partnerships for the purpose of advancing wildfire science. Below are additional details regarding some of these partnerships:

- SDG&E has established a 3-year strategic partnership with leading experts in climate at Scripps Institute of Oceanography to study the onset of wildfire suppressing precipitation in San Diego County, with attention paid to impacts on wildfire and subsequent later autumn and winter season hydrological measures. Scripps will examine the variability from year to year, documenting the types of storms that produce the precipitation, quantifying the current lead time in predicting these events, and identifying potential approaches to display and to predict these important storms. These late season

storms and the impact on the wildfire environment could have an impact on PSPS frequency in the future.

- The San Jose State University project will develop new Live Fuel Moisture Content (LFMC) tools to better assess fire danger in the SDG&E service territory using state-of-the-science remote sensing data sets. These tools will be developed using the new high-resolution data from various satellite products eventually leading to a dataset and methodology to incorporate these tools into the Technosylva FireCast fire behavior modeling platform.
- SDG&E is also working with the San Diego Supercomputer Center (SDSC) to ingest and store SDG&E datasets for weather forecast, fire potential index and fuels to enable publicly available findability and accessibility of these datasets for various stakeholders and all researchers through web services and visual maps. Application Programming Interfaces will enable time range or geolocation and tagged metadata-based querying as well as grouping and sub-setting of datasets for context-driven use. The map services will enable layering of these datasets for use in fire modeling. The project will maintain a server at SDSC for data access along with data storage capabilities stored at SDSC and back up storage on Amazon Cloud.

The FSCA department continues to focus on collaborations with stakeholders in the community and academia. The FSCA department envisions establishing long-lasting partnerships with academia to create opportunities to educate the next generation of utility wildfire subject matter expertise.

2. Initiative Impact

The FSCA allows SDG&E to understand and plan for changing climate conditions that are contributing to an increase in wildfire potential throughout California. The department allows

SDG&E to meet the needs of increasing wildfire and climate-related risks. The FSCA allows SDG&E to respond to and strategize for its fire preparedness activities and programs.

H. Fire Potential Index

Year	Units	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	n/a	$270	-	-	-	$270	-
2020	n/a	$1,191	-	-	-	$1,191	-
2021	n/a	$1,446	-	-	-	$1,446	-
2022	n/a	$1,632	-	-	-	$1,632	-
Total	**n/a**	**$4,539**	-	-	-	**$4,539**	-

1. Initiative Description

When an ignition occurs, the potential for it to develop into a wildfire depends on many variables. The FPI was developed to communicate the wildfire potential on any given day to promote safe and reliable operations. This 7-day forecast product, produced daily, classifies the fire potential based on weather and fuels conditions and historical fire occurrences.

The FPI reflects key variables such as the state of native grasses across the service territory ("green-up"), fuels (ratio of DFM component to LFM component), and weather (sustained wind speed and dew point depression). Each of these variables is assigned a numeric value and those individual numeric values are summed to generate a Fire Potential value from 0 to 17, each of which expresses the degree of fire threat expected for each of the 7 days included in the forecast. The numeric values are classified as "Normal", "Elevated", and "Extreme".

The FPI values and their usefulness were validated by recreating historical values for the past 10 years. The historical results bore a very strong correlation to actual fire events in terms of the severity of past fires and, in particular, provided accurate information as to when the risks of uncontrolled and large-scale wintertime fires were high.

2. Initiative Impact

The FPI is used daily to communicate the wildfire potential on any given day to promote safe and reliable operations. The situational awareness provided by the FPI delivers guidance to

operational groups within SDG&E to understand the types of activities that are safe to perform, and when additional precautions such as wildfire protection teams or sensitive relay profiles are required.

I. High Performance Computing Infrastructure

Year	Units	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	n/a	-	-	-	-	-	-
2020	n/a	-	-	-	-	-	-
2021	n/a	-	-	-	-	-	-
2022	n/a	$5,240	-	-	-	$5,240	-
Total	**n/a**	**$5,240**	**-**	**-**	**-**	**$5,240**	**-**

1. Initiative Description

Models that have been developed to mitigate wildfire risk require an increasing number of compute cores to run in a timely manner to support utility operations. To address this issue, high-performance computing clusters generate high-quality weather data that is incorporated directly into operations. Collectively, nearly 2,000 compute core hours of high-performance computing are used per day to generate operational products, including the SAWTI, FPI, and WRRM-Ops.

SDG&E acquired two new high-performance computing clusters in 2022 that generate high-quality weather data that is incorporated directly into operations. Collectively, nearly 2,000 compute core hours of high-performance computing are used per day to generate operational products, including the SAWTI, FPI, and WFA-E. The forecast data generated by these supercomputers is shared with researchers and various stakeholders and APIs enable public access to WMP-related datasets by authorized users for use in fire modeling.

2. Initiative Impact

The new high-performance computing clusters provide data that enable SDG&E's operational products to be accurately and reliably produced. The situational awareness provided by these products delivers guidance to operational groups within SDG&E to understand the types

of activities that are safe to perform, and when additional precautions such as wildfire protection teams or sensitive relay profiles are required.

IV. GRID DESIGN AND SYSTEM HARDENING

Grid Design and System Hardening: 2019-2022 totals ($000)						
Initiative	**Actual Capital**	**Actual O&M**	**Authorized Capital**	**Authorized O&M**	**Differential Capital**	**Differential O&M**
SCADA Capacitors	$6,967	-	$8,914	-	$(1,946)	-
Covered Conductor	$136,496	$3,762	-	-	$136,496	$3,762
Expulsion Fuse Replacement	$17,922	-	-	-	$17,922	-
PSPS Sectionalizing Enhancements	$11,135	-	-	-	$11,135	-
Microgrids	$20,170	$3,292	-	-	$20,170	$3,292
Advanced Protection	$48,931	$153	$56,197	-	$(7,267)	$153
Hotline Clamps	-	$9,937	-	-	-	$9,937
Generator Grant Programs	-	$17,117	-	-	-	$17,117
Generator Assistance Programs	-	$2,250	-	-	-	$2,250
Standby Power Programs	-	$22,744	-	-	-	$22,744
Strategic Undergrounding	$241,233	$176	-	-	$241,233	$176
Distribution Overhead System Hardening	$380,799	$10,716	$283,660	$21,302	$97,139	$(10,586)
Transmission Overhead System Hardening – Distribution Underbuilt	$17,851	-	$3,530	-	$14,321	-
Cleveland National Forest Fire Hardening	$147,721	$2,456	$83,281	-	$64,440	$2,456
Distribution Communications Reliability Improvements	$140,411	$715	$97,789	-	$46,622	$715
Lightning Arrestor Replacements	$5,556	$28	-	-	$5,556	$28
Avian Mitigation	$2,189	$17	$4,041	-	$(1,852)	$17
Total	**$1,177,380**	**$73,363**	**$537,412**	**$21,302**	**$639,968**	**$52,060**

SDG&E's grid hardening initiatives are aimed at reducing the risk of wildfires caused by utility equipment and minimizing impacts to customers from mitigations such as PSPS. Programs such as the strategic undergrounding and covered conductor prevent risk events from occurring across several drivers, such as energized wire down and foreign object contact. Other programs such as protection and equipment programs including Advanced Protection, the Expulsion Fuse Replacement Program, and the Lightning Arrester Program do not prevent risk events from occurring, but instead reduce the chance that a risk event will result in an ignition by utilizing protection settings and/or equipment that addresses a specific failure mode known to lead to the ignition. Other programs reduce PSPS impacts to customers, including the PSPS Sectionalizing Program, installation of microgrids, and generator programs. Strategic undergrounding—a system hardening effort—reduces the need for mitigations such as PSPS while also reducing the risk of utility-caused wildfires. SDG&E's grid hardening programs, operations, and maintenance programs have contributed significantly to the Company earning the ReliabilityOne® Award for "Outstanding Reliability Performance" among utilities in the West for 17 consecutive years.

A. Supervisory Control and Data Acquisition (SCADA) Capacitors

Year	Units (capacitors)	Actual Capital	Actual O&M		Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	0	-	-	$3,571	-	$(3,571)	-	
2020	30	$1,024	-	$1,728	-	$(704)	-	
2021	35	$2,087	-	$1,784	-	$303	-	
2022	58	$3,856	-	$1,830	-	$2,026	-	
Total	**123**	**$6,967**	**-**	**$8,914**	**-**	**$(1,946)**	**-**	

1. Initiative Description

Current capacitors are designed to provide continuous voltage and power factor correction for the distribution system. During a failure of a capacitor from either mechanical, electrical, or environmental overstress, an internal fault is created resulting in internal pressure and the potential to rupture the casing. This rupture of molten metal has the potential to be an ignition source.

Capacitor faults are currently protected through fusing, which is not always effective at preventing this high-risk failure from becoming an ignition source.

The SCADA Capacitors Maintenance and Replacement Program was developed to replace existing non-SCADA capacitors with a more modern SCADA-switchable capacitor or to remove non-SCADA capacitors if not required for voltage or reactive support. These modernized capacitors have a monitoring system to check for imbalances and isolate internal faults before they become catastrophic. SCADA capacitors also have the capacity for remote isolation and monitoring of the system which provides additional situational awareness during extreme weather conditions. The SCADA Capacitors Maintenance and Replacement Program prioritizes replacing or removing fixed capacitors from service and then addresses capacitors with switches. Both types of capacitors will be modernized to a SCADA switchable capacitor. While this program will not reduce capacitor faults, the advanced protection equipment is designed to detect and isolate issues before a capacitor rupture occurs, reducing the failure mode most likely to lead to an ignition.

2. Initiative Impact

Capacitors caused one ignition in the HFTD based on ignition data from 2015-2019. It is estimated that the SCADA Capacitors Program has reduced capacitor-caused HFTD ignitions by 0.235 from 2019-2022. This estimate is derived by evaluating historical data on faults that could cause ignitions to determine ignition rates and estimating a reduction in ignition rates because of capacitor replacements.

Risk Reduction Estimation for the SCADA Capacitor Program	
Risk Events HFTD (average 2015 – 2019)	1
Average Ignition Rate HFTD	3.42%
Estimated Effectiveness	80.00%
Ignition Reduction Estimate HFTD (2015 – 2019)	1 x 3.42% x 80% = 0.02736
Total Capacitors (2019-2022)	143
Capacitors replaced in HFTD (2019-2022)	123
Ignitions reduced HFTD (2019-2022)	0.02736 x (123 /143) = 0.235

B. Covered Conductor

Year	Units (miles)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	0	$1,487	-	-	-	$1,487	-
2020	1.9	$2,110	$24	-	-	$2,110	$24
2021	20	$39,638	$517	-	-	$39,638	$517
2022	61.2	$93,261	$3,221	-	-	$93,261	$3,221
Total	**83.1**	**$136,496**	**$3,762**	**-**	**-**	**$136,496**	**$3,762**

1. Initiative Description

The Covered Conductor Program is a program that replaces bare conductors with covered conductors in the HFTD. Covered conductors are manufactured with an internal semiconducting layer and external insulating ultraviolet-resistant layers to provide incidental contact protection. SDG&E initially began to examine covered conductors from a personnel safety and reliability standpoint. The three-layered construction showed prospective reduction of injuries to people in the event of an energized wire-down in which the wire contacted a person and/or also might reduce the step potential to people in the vicinity. In late 2018, focus was shifted towards using covered conductor as an alternative to SDG&E's traditional overhead hardening program with the primary focus of reducing utility-caused ignitions. Covered conductor can reduce outages that result from light momentary contacts (*e.g.*, mylar balloons, birds, and palm fronds) that can result in an ignition.

In addition to installing the covered conductor system, SDG&E also replaces other equipment that is required to accommodate the covered conductor, such as insulators, cross arms, or poles (where applicable), replacing other equipment that is determined to reduce risk, improve resiliency, and adding other protection measures such as animal guards or covered jumper wire to other equipment on the pole. SDG&E has estimated that in the near-term, covered conductor can reduce the faults that cause ignitions by approximately 65%.

The Commission has recognized the importance of ensuring pole loading and spacing requirements are met, stating "[i]t is of utmost importance to perform pole-loading calculations …

to ensure that utility poles do not become overloaded and fail, which could ignite a fire, injure and kill people, and destroy property."[41] SDG&E standards require that all overhead design, including covered conductor, within the HFTD be performed utilizing Power Line Systems – Computer Aided Drafting and Design (PLS-CADD) to improve modeling and design. PLS-CADD allows SDG&E to leverage Light Detection and Ranging (LiDAR) survey data to ensure poles, wires, and anchors meet General Order (GO) 95 loading and clearance requirements as well as known local wind conditions.

The Covered Conductor Program also has the potential to raise the threshold for PSPS events to higher wind speeds compared to bare conductor hardening; however, as of the end of 2022 no circuits have been fully hardened with covered conductor and therefore the threshold for PSPS events has not been raised on any circuits with covered conductor installed. However, SDG&E has benchmarked with other utilities and performed internal testing and believes the wind speed threshold for fully covered circuit segments will be approximately 55-60 miles per hour.

The effectiveness of covered conductor over the long term is still under investigation, as it is likely that the equipment failure risk drivers, such as transformer failures, will reduce over time as the equipment ages. Covered conductor also does not have the same indirect cost benefits as strategic undergrounding. Since infrastructure remains above ground, the need for vegetation management operations and detailed inspections—as well as the associated costs—will also remain.

2. Initiative Impact

Over the 2019-2022 period, covered conductor is expected to have reduced 0.15 ignitions annually. This estimate is derived by evaluating different causes of ignitions using five-year

[41] D.12-01-032 at Finding of Fact 12.

ignition data from 2015-2019 and estimating a potential reduction in each cause based on estimates of effectiveness of covered conductor.

Risk Reduction Estimation for the CC Program	
Pre-mitigation risk events HFTD (2015 – 2019)	15.2
Effectiveness Estimate	65.00%
Post-mitigation risk events HFTD (2015 – 2019)	35%*15.2 = 5.3
Ignition rate HFTD (2015 – 2019)	3.42%
Pre-mitigation HFTD ignitions (2015 – 2019)	15.2*3.42% = 0.518
Post-mitigation HFTD ignitions (2015 – 2019)	5.3*3.42% = 0.337
Ignitions reduced in HFTD (2015 – 2019)	0.518 - 0.337 = 0.18
Miles of mitigation in HFTD (2019-2022)	83.13
Per mile baseline	100
Ignitions reduced in HFTD Post Mitigation (2019-2022)	0.18*(83.13/100) = 0.15

C. Expulsion Fuse Replacement

Year	Units (fuses)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	2490	$3,858	-	-	-	$3,858	-
2020	3179	$6,744	-	-	-	$6,744	-
2021	3976	$6,655	-	-	-	$6,655	-
2022	231	$665	-	-	-	$665	-
Total	**9,876**	**$17,922**	**-**	**-**	**-**	**$17,922**	**-**

1. Initiative Description

When the distribution system experiences a fault or overcurrent, there are fuses connected to the system to protect its integrity and isolate the fault. These expulsion fuses are designed to operate by creating a significant expulsion within the fuse, resulting in the fuse opening and isolating the fault, and in turn limiting further damage to other equipment. Because of this internal expulsion, the fuses are equipped with a venting system that sends a discharge of energy out of the fuse and into the atmosphere. This external discharge has the potential to ignite flammable vegetation.

The Expulsion Fuse Replacement Program replaces existing expulsion fuses with new, more fire safe expulsion fuses that are approved by CAL FIRE. These new expulsion fuses reduce

the discharge expelled into the atmosphere, reducing the chance of a fuse operation leading to an ignition.

2. Initiative Impact

Over the 2019-2022 time period, replacements completed by the Expulsion Fuse Replacement Program is estimated to reduce approximately 2.5 ignitions. Based on preliminary study results, work done by the program to install CAL FIRE-approved fuses is 100 percent effective at reducing ignition risk. Because SDG&E plans to complete this mitigation, replacing all expulsion fuses within the HFTD by 2023, SDG&E estimates that all ignitions from this cause will be mitigated.

Risk Reduction Estimation for the Expulsion Fuse Replacement Program	
Expulsion Fuse Operation HFTD (2015 – 2019)	83
Average ignition rate HFTD (2015 – 2019)	3.42%
Pre mitigation ignitions HFTD (2015 – 2019)	83*3.42% = 2.84
Number of total fuses HFTD (2019-2022)	11,141
Fuses replaced HFTD (2019-2022)	9876
Ignition Reduced HFTD (2019-2022)	(9876/11141)*83*3.42% = 2.52

D. PSPS Sectionalizing Enhancements

Year	Units (switches)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	7	$1,352	-	-	-	$1,352	-
2020	23	$5,174	-	-	-	$5,174	-
2021	13	$2,099	-	-	-	$2,099	-
2022	12	$2,510	-	-	-	$2,510	-
Total	**55**	**$11,135**	**-**	**-**	**-**	**$11,135**	**-**

1. Initiative Description

The PSPS Sectionalizing Enhancement Program installs switches in strategic locations, improving the ability to isolate high-risk areas for potential de energization. For example, switches are installed on circuits that have significant sections underground, allowing customers with this lower-risk infrastructure to remain energized during weather events. Another example is

combining weather stations with sectionalizing devices to de-energize only sections of circuits that are experiencing extreme wind events.

2. Initiative Impact

By increasing the number of remotely operated sectionalizing devices on higher risk circuits, SDG&E has reduced the number of customers that have the potential to be impacted by a PSPS event by over 10,000 customers within the HFTD. These devices can also potentially reduce the duration of de-energization based on local wind events.

E. Microgrids

Year	Units (microgrids)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	0	$194	-	-	-	$201	-
2020	4	$3,610	$377	-	-	$3,610	$377
2021	0	$13,424	$1,490	-	-	$13,424	$1,490
2022	1	$2,943	$1,425	-	-	$2,943	$1,425
Total	**5**	**$20,170**	**$3,292**	**-**	**-**	**$20,170**	**$3,292**

1. Initiative Description

The Microgrid Program is a program that designs and builds microgrids that can be electrically isolated during a PSPS event, thereby maintaining electric service to customers who would otherwise be affected. While alternative hardening solutions, such as strategic undergrounding, may be better at simultaneously mitigating wildfire risk, those options are not always technically feasible or cost-effective. For instance, customers who are located far away from a substation or central source of generation would require additional mileage of undergrounding that can be cost-prohibitive. Additionally, undergrounding may not be feasible, whether due to hard rock, environmental, or cultural concerns.

A combination of data including the risk of wildfire from overhead infrastructure, feasibility of traditional overhead hardening solutions, alternative solutions such as undergrounding distribution infrastructure, and historical PSPS impact data is used to guide the installation of microgrids. Additional information such as identification of critical facilities or

AFN customers is incorporated into prioritizing targeted locations for a potential microgrid project.

2. Initiative Impact

The four microgrids installed between 2019-2022 are expected to reduce PSPS impacts to a total of 662 customers. This number is calculated based on the locations of microgrids and the customers they serve. Because microgrids are designed to keep customers energized throughout the duration of a PSPS event, the effectiveness of the mitigation is estimated to be 100 percent.

F. Advanced Protection

Year	Units (circuits)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	0	$3,612	-	$23,533	-	$(19,921)	-
2020	6	$9,388	-	$10,568	-	$(1,179)	-
2021	4	$11,121	-	$10,907	-	$214	-
2022	3	$24,809	$153	$11,190	-	$13,619	$153
Total	**13**	**$48,931**	**$153**	**$56,197**	**-**	**$(7,267)**	**$153**

1. Initiative Description

The Advanced Protection Program (APP) develops and implements advanced protection technologies within electric substations and on the electric distribution system. It aims to prevent and mitigate the risks of fire incidents, provide better transmission and distribution sectionalization, create higher visibility and situational awareness in fire-prone areas, and allow for the implementation of new relay and automation standards in locations where protection coordination is difficult due to lower fault currents attributed to high impedance faults.

More advanced technologies, such as microprocessor-based relays with synchrophasor/phasor measurement unit (PMU) capabilities, real-time automation controllers, auto-sectionalizing equipment, line monitors, direct fiber lines, Private LTE and wireless communication radios comprise the portfolio of devices that are installed in substations and on distribution circuits to allow for a more comprehensive protection system and greater situational awareness in the fire-prone areas of the HFTD. Advanced protection technologies implemented by this program include:

- Falling Conductor Protection (FCP) designed to trip distribution and transmission overhead circuits before broken conductors can reach the ground energized
- Sensitive Ground Fault (SGF) Protection for detecting high impedance faults resulting from downed overhead conductors that result in very low fault currents
- Sensitive Relay Profile (SRP) Settings enabled remotely on distribution equipment to reduce fault energy and fire risk
- High Accuracy Fault Location for improved response time to any incident on the system
- Remote Relay Event Retrieval and Reporting for real-time and post-event analysis of system disturbances or outages
- SCADA Communication to all field devices being installed for added situational awareness
- Increased Sensitivity and Speed of Transmission Protection Systems to reduce fault energies and provide swifter isolation of transmission system faults
- Protection Integration with emerging telecommunications technologies such as direct fiber, Private LTE, and wireless radios as a means of facilitating the communication infrastructure needs of APP

APP replaces aging substation infrastructure such as obsolete substation circuit breakers, electro-mechanical relays, aging solid-state relays, aging microprocessor relays, and Remote Terminal Units (RTUs). New circuit breakers incorporating microprocessor-based relays, RTUs, and the latest in communication equipment are also installed in substations within the HFTD. On distribution circuits within the HFTD, APP coordinates with the overhead system hardening programs to strategically install or replace sectionalizing devices, line monitors, direct fiber lines, and communication radios to facilitate the requirements of SDG&E's advanced protection systems.

2. Initiative Impact

The impact of Advanced Protection is calculated by estimating the ignition reduction attributed to Falling Conductor Protection. FCP can sense a break in conductor and isolate a fault before it occurs and is focused on mitigating risk events associated with wire downs. To calculate

the benefit of this mitigation, SDG&E utilized the 5-year average of wire down events unmitigated by other mitigations such as hot line clamps, the ignition percentages within the HFTD, and the percent of circuits that would be enabled with FCP between 2019-2022. This results in an expected 0.085 ignitions reduced over the 2019-2022 time period.

Risk Reduction Estimation for the FCP Program	
HFTD wire downs (2015-2019 average)	39.4
Wire down with connection failures HFTD (2015-2019 average)	2.2
Wire Down Mitigated HFTD (2015-2019 average)	39.4 - 2.2 = 37.2
Ignition rate HFTD (2015 – 2019 average)	3.42%
No of Pre-mitigation ignitions HFTD (2015-2019 average)	37.2*3.42% = 1.27
Mitigation Effectiveness Estimate	100%
Ignitions reduction estimate HFTD (2015-2019 average)	1.27224*100% = 1.27
Circuits with FCP Installed in HFTD (2019 - 2022)	13
Total HFTD circuits (2019 - 2022)	194
Ignitions reduced HFTD (2019 - 2022)	1.27*(13/194) = 0.085

G. Hotline Clamps

Year	Units (clamps)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	660	-	$923	-	-	-	$923
2020	2061	-	$3,305	-	-	-	$3,305
2021	2743	-	$3,722	-	-	-	$3,722
2022	1903	-	$1,987	-	-	-	$1,987
Total	**7,367**	**-**	**$9,937**	**-**	**-**	**-**	**$9,937**

1. Initiative Description

Connectors that have been connected directly to overhead primary conductors, known as hotline clamps (HLCs), are associated with creating a weak connection which could result in a wire down event. This in turn could lead to an energized wire either making contact with the ground or a foreign object where it could become a source of ignition.

The HLC Replacement Program replaces HLC connections that are connected directly to overhead primary conductors with compression, wedge, or other approved connections to eliminate the risk of wire-down failure and the associated ignition risk. HLC connections will be installed concurrently with other asset replacement initiatives across the HFTD such as avian

protection, fuse replacements, and lightning arrester replacements to achieve efficiencies in design and construction.

2. Initiative Impact

To estimate the risk reduction, data from historical wire downs associated with connection failures, ignition percentages within the HFTD, and the number of replacements completed by the end of 2022 was gathered. SDG&E estimates that ignitions were reduced by 0.0587 ignitions over the 2019-2022 time period.

Risk Reduction Estimation for the HLC Replacement Program	
HFTD wire downs (2015-2019 average for connector failures)	2.2
Ignition rate HFTD (2015 – 2019 average)	3.42%
Mitigation Effectiveness	90.00%
Estimated Ignition Reduction HFTD (2015 – 2019)	2.2*3.42%*90% = 0.0677
Total Hotline Clamps in the network HFTD (2019-2022)	8500
Hotline clamps replaced HFTD (2019-2022)	7367
Ignition Reduced HFTD (2019-2022)	(7367/8500)*2.2*3.42%*90% = 0.0587

H. Generator Grant Programs

Year	Units (generators)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	0	-	$592	-	-	-	$592
2020	1420	-	$5,078	-	-	-	$5,078
2021	2310	-	$7,896	-	-	-	$7,896
2022	921	-	$3,552	-	-	-	$3,552
Total	**4,651**	**-**	**$17,117**	**-**	**-**	**-**	**$17,117**

1. Initiative Description

The Generator Grant Program (GGP) focuses on enhancing resiliency among the most vulnerable customer segments to enable access to electricity for medical devices and critical appliances during a PSPS event. This program was previously referred to as the Resiliency Grant Program.

The GGP offers portable backup battery units with solar charging capacity to customers, leveraging cleaner, renewable generator options to give vulnerable customers a means to keep small devices and appliances charged and powered during PSPS events. The GGP, launched in

2019, focuses on the needs of MBL and Life Support customers in addition to other customers with access and functional needs in Tiers 2 and 3 of the HFTD who have experienced an outage due to a PSPS event. Eligible customers are proactively contacted and educated about the GGP.

2. Initiative Impact

The GGP does not reduce PSPS risk but reduces the impact of PSPS for vulnerable customers. Through 2022, the GGP reduced the impact of PSPS events by providing portable backup battery units to approximately 4,700 customers. This represents the total number of customers who have received units, though a portion of these customers may have experienced subsequent changes in location, MBL standing, or other eligibility status.

I. Generator Assistance Programs

Year	Units (generators)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	65	-	-	-	-	-	-
2020	1274	-	$746	-	-	-	$746
2021	735	-	$744	-	-	-	$744
2022	140	-	$759	-	-	-	$759
Total	**2,214**	**-**	**$2,250**	**-**	**-**	**-**	**$2,250**

1. Initiative Description

The Generator Assistance Program (GAP) focuses on enhancing resiliencies for all customers who reside in Tiers 2 and 3 of the HFTD and may be impacted by PSPS events. While the GGP addresses the needs of the most medically vulnerable and the Standby Power Program focuses on customers that do not have other grid hardening initiatives planned in their area, the GAP expands resilience opportunities to the general market in Tiers 2 and 3 of the HFTD. This program was previously referred to as the Resiliency Assistance Program.

The GAP launched in 2020 and offers rebates for portable fuel generators and portable power stations to encourage customers to acquire backup power options to enhance preparedness and mitigate the impacts of PSPS. The target audience are customers who reside within Tiers 2 and 3 of the HFTD and have experienced at least one PSPS event since 2019. Eligible customers receive program materials via mail and email campaigns and are directed to an online portal to

verify account information and learn more about the program. Upon verification, the program offers a $300 rebate to customers who meet the basic eligibility criteria of residing in an HFTD zone and experiencing a recent PSPS event. In addition, customers enrolled in the California Alternate Rates for Energy (CARE) program are eligible for an enhanced rebate amount of $450, providing a 70 to 90 percent discount on average portable generator models. The program also includes portable power stations and offers rebates of $100, with an additional $50 for CARE customers. The program provides the option for customers to receive one rebate for a fuel generator and one rebate for a portable power station to accommodate various backup power needs.

2. Initiative Impact

The GAP does not reduce PSPS risk but reduces the impact of PSPS for customers. Through 2022, GAP reduced the impact of PSPS events by providing rebates to approximately 2,100 customers. This represents the total number of customers who have received rebates, though a portion of these customers may have experienced subsequent changes in location or other eligibility status.

J. Standby Power Programs

Year	Units (generators)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	0	-	-	-	-	-	-
2020	75	-	$1,754	-	-	-	$1,754
2021	355	-	$8,937	-	-	-	$8,937
2022	376	-	$12,052	-	-	-	$12,052
Total	**806**	**-**	**$22,744**	**-**	**-**	**-**	**$22,744**

1. Initiative Description

The Standby Power Program, which is an umbrella program that includes several other programs, targets customers and communities that will not directly benefit from other grid hardening programs. These customers reside in the backcountry and are generally widely distanced from one another, therefore traditional grid hardening initiatives will not reduce

potential PSPS exposure. The Standby Power Program consists of the Fixed Backup Power (FBP) Program targeting residential customers, FBP Program targeting commercial customers, and the Mobile Home Park Resilience Program (MHRP) which targets mobile home park clubhouses.

Standby Power Program was introduced to assist rural customers in the HFTD that may not benefit from near- or long-term traditional hardening initiatives. Other hardening initiatives in these communities would be ineffective and costly, with no guarantee that power would not be shut off during a PSPS event. Instead, providing fixed standby generators is the most efficient remedy for certain rural customers that are likely to experience PSPS events.

Customers are identified based on meter, circuit and PSPS event exposure. Outreach letters and communication are sent to customers inviting them to participate and, depending on site requirements, feasibility, and cost, a customer could receive a fixed installation backup generator, a business could receive a critical facility generator on a temporary basis during an active PSPS event, or a clubhouse or central community building at a mobile home park could receive a solar panel and battery backup system to provide resilient access to electricity during power outages, particularly during a PSPS event. The program manages site permitting, construction, and final inspection to ensure the equipment is installed properly.

2. Initiative Impact

PSPS events can have negative customer impacts and should be limited as much as feasible to the specific areas that are experiencing extreme risk. This is especially important for customers who may require medical devices to be powered 24 hours a day, 7 days a week. The Standby Power Program does not reduce PSPS risk but reduces the impact of PSPS for vulnerable customers. Through 2022, the Standby Power Program provided backup power solutions to approximately 820 residential and nine commercial customers thereby reducing PSPS consequences. The generators provided to customers as a part of this program are whole-facility solutions that are expected to keep the customers energized throughout a PSPS event.

K. Strategic Undergrounding

Year	Units (miles)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	3	$198	-	-	-	$198	-
2020	15.5	$39,293	-	-	-	$39,293	-
2021	26	$70,534	-	-	-	$70,534	-
2022	65	$131,208	$176	-	-	$131,208	$176
Total	**109.5**	**$241,233**	**$176**	**-**	**-**	**$241,233**	**$176**

1. Initiative Description

The Strategic Undergrounding Program converts overhead systems to underground, providing the dual benefits of significantly reducing wildfire risk and the need for PSPS events in these areas. SDG&E estimates that Strategic Undergrounding reduces the risk of ignition related to electrical infrastructure by 98% or greater. Importantly, by moving the infrastructure underground, most faults that can cause an ignition (except vehicle contact with pad mounted equipment) are mitigated in their entirety. Additionally, even as the equipment ages and failures occur, the chance of that failure becoming an ignition—the source of significant risk for above ground infrastructure—is near zero when the infrastructure is underground. The likelihood of PSPS is also significantly reduced on circuits that are fully undergrounded as the wind speed and other weather conditions do not impact the infrastructure.

SDG&E deploys strategic undergrounding in the HFTD as well as in areas where substantial PSPS-event reductions can be gained through strategic installation of the underground electric system. SDG&E's initial undergrounding scope was based on the WRRM model. Since 2022, SDG&E's hardening strategy utilizes the WiNGS-Planning tool to develop its risk reduction goals and the grid hardening mitigations required to achieve them. SDG&E has specifically aimed to reduce PSPS impacts for critical facilities, including schools, or other areas with frequent PSPS events. For instance, SDG&E completed undergrounding a section of overhead infrastructure in the Hellhole Canyon area, which has seen wind gusts over 90 miles per hour, and experienced

seven PSPS events in 2019 and 2020 but was not de-energized during SDG&E's PSPS event in 2021.

SDG&E's early investments in undergrounding—from 2020-2022—aided the company in a more efficient and cost-effective undergrounding strategy that will produce long term benefits for customers. As it gains more experience, SDG&E has identified several improvements affecting the cost and feasibility of strategic undergrounding projects. One example of this innovation is SDG&E's development of new standards allowing for a decreased trench depth from 30 inches to 24 inches of trench cover. This new design standard reduces construction effort and cost, especially in difficult rocky terrain. SDG&E has also implemented reduced conduit diameters, instead of applying a one-size-fits-all-approach. By using the minimum conduit size for the project's cable size and future system need, SDG&E can achieve a decreased trench depth, reducing the civil construction effort, utilities conflict, and overall cost. Additionally, SDG&E has implemented breakaway technology when overhead service wire is required for a customer. This allows the service wire to disconnect from power when struck by debris and the span of overhead wire to break free and deenergize. This technology is a useful alternative when customers raise

concerns about undergrounding or SDG&E encounters difficulties physically undergrounding some routes.

SDG&E also made several enhancements to reduce the overall schedule of undergrounding projects. SDG&E identifies permitting requirements as early as possible to accurately scope and schedule the project. Agencies such as Cleveland National Forest, Caltrans, and the Bureau of Indian Affairs typically have a longer permitting lead time compared to San Diego County permits, and those timelines need to be accurately reflected in the schedule. When working with these agencies SDG&E involves them early in the process to define a clear permitting approach and strategy. SDG&E has also utilized trenchless technologies such as Horizontal Directional Drilling (HDD) and Auger Boring (also known as Jack and Bore) when environmentally sensitive areas or difficult easements are encountered. These technologies are also used at Caltrans crossings to reduce the permitting process time.

WiNGS-Planning now assists in the allocation of grid hardening initiatives across the HFTD based on assessment of both wildfire risk and PSPS impacts. Data on historic PSPS events, wind conditions, and others are reviewed to determine where undergrounding will have the largest impact. Constraints such as environmental, permitting, and design are also taken into consideration. Beginning in 2023, the priority and scope of the projects will be dictated by full circuit analysis using the WiNGS model and input gathered from operational teams. WiNGS-Planning is built upon the MAVF framework in RAMP and evaluates both wildfire and PSPS impacts at the sub-circuit/segment level. Information is used to inform investment decisions by determining and prioritizing mitigation based on RSE, improving wildfire safety, and limiting the impact of PSPS on customers. This also results in the highest risk segments being scoped earlier to achieve the risk reduction earlier in the planning cycle. Over the next four years, over 90% of the mileage being hardened is within the 20% riskiest circuit segments.

To develop the optimum portfolio, SDG&E has run different scenarios through WiNGS-Planning. These scenarios include assuming all circuit segments that require hardening are undergrounded, assuming all circuit segments that require hardening are protected with covered conductor, and last allowing WiNGS-Planning to optimize the portfolio with a blend of the two mitigations. This is possible because WiNGS can assess the risk reduction and RSE at the circuit segment level to understand the value of undergrounding at both the portfolio and the segment-specific levels. The WiNGS optimized portfolio achieves the most risk reduction for every dollar spent over SDG&E's 10-year portfolio assessment, achieving 83% wildfire risk reduction at a cost of $31 million for every 1% of wildfire risk reduction. The fully covered conductor scenario costs less in total, but only achieves 50% wildfire risk reduction at an increased $36 million for every 1% of wildfire risk reduction. The fully undergrounded scenario achieves the most risk reduction at 85%, but the extra costs make it less efficient at $42 million for every 1% of wildfire risk reduction. This optimized portfolio results in more undergrounding in the future when compared to covered conductor.

Figure 2: Undergrounding Scenarios Analysis

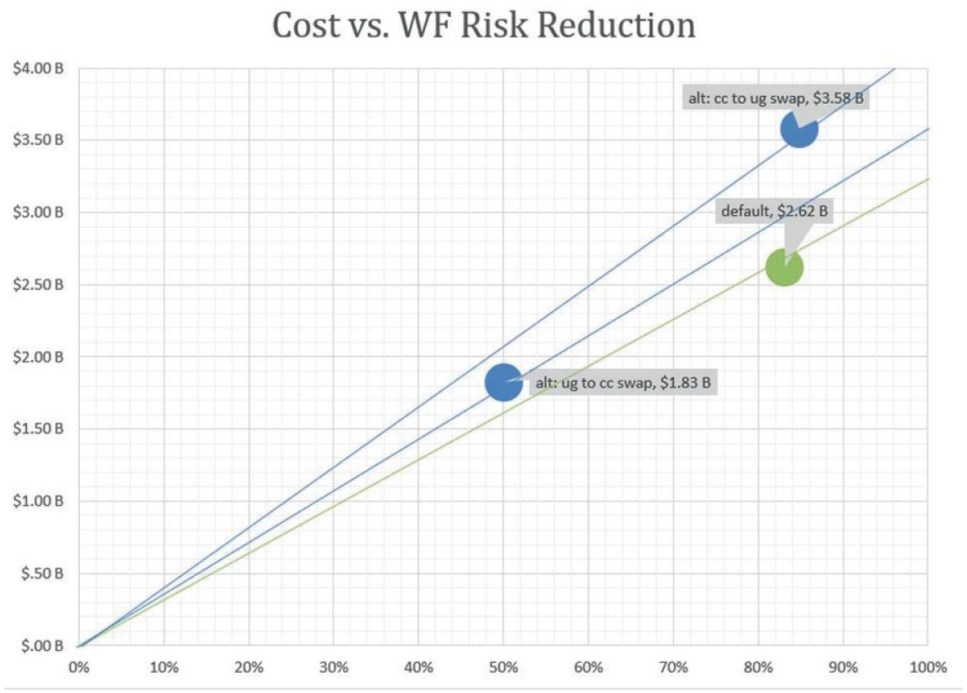
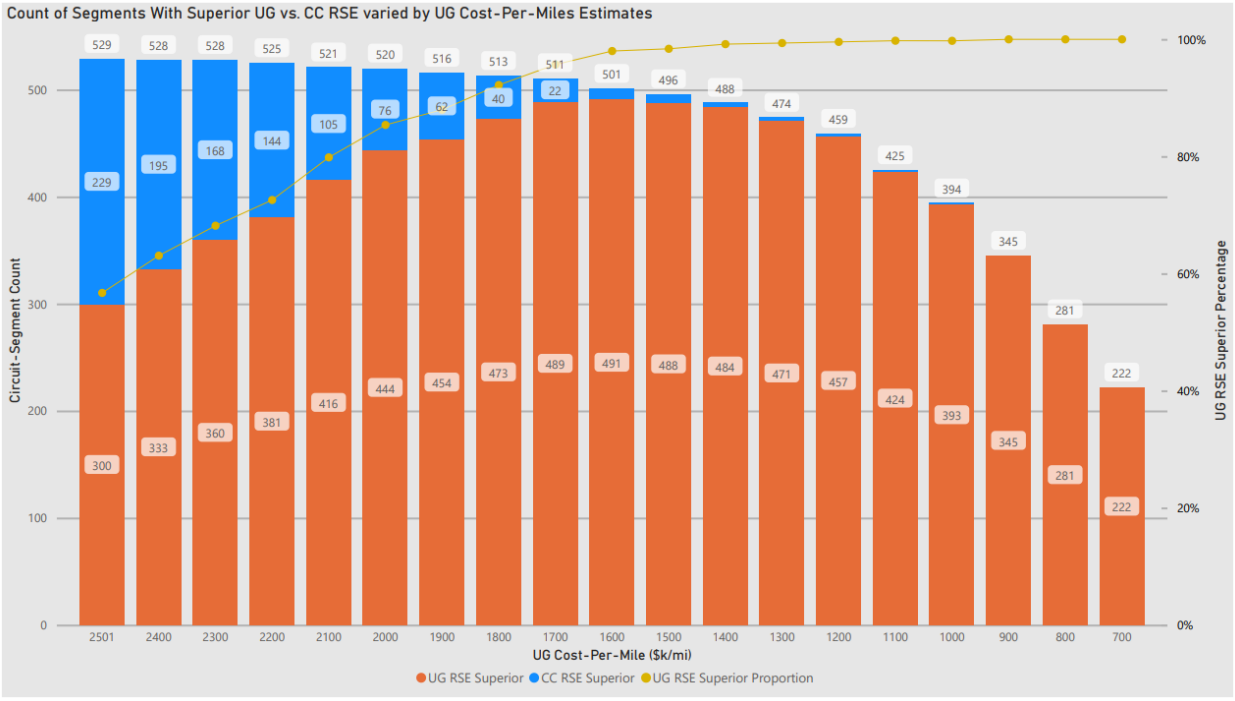


Figure 3: Undergrounding Scenarios Value

Mitigation Portfolio	Dollar to Wildfire Risk Reduction (WFRR)
Optimized WiNGS-Planning Portfolio	$31M for every 1% WFRR
Undergrounding all mitigated segments	$42M for every 1% WFRR
Covered Conductor all mitigated segments	$36M for every 1% WFRR

As noted above, SDG&E continues to work on reducing the costs associated with undergrounding and has driven costs down from over $3 million per mile to approximately $2.5 million per mile currently, with forecasted reductions to approximately $2 million per mile in the next two years. SDG&E has performed an analysis to review how these cost reductions would impact the planning of initiatives. As the costs for underground decrease and approach the costs of installing covered conductor, the value of undergrounding grows. As the chart below demonstrates, when the undergrounding costs are at $2 million per mile 80% of all circuit segments would have a higher RSE for undergrounding than for covered conductor.

Figure 4: Undergrounding RSE's Improve as Costs Decrease



Additionally, undergrounding work provides additional benefits that are still being understood and quantified. Aside from the greater wildfire and PSPS risk reduction, lifecycle cost reductions associated with reduced vegetation management and asset inspections can create long-term operating savings. Undergrounding also protects the community from other unforeseen risks that are yet to be quantified. As SDG&E and the other California utilities better understand how to model and quantify the risks associated with climate change, the health and greenhouse gas impacts of wildfire smoke, and other items the risk of wildfire is likely understated by current models which will drive more segments to undergrounding in the future.

2. Initiative Impact

To calculate the wildfire risk reduction for strategic undergrounding, data on historical ignitions associated with underground equipment, pre-mitigation overhead system risk event rate and ignitions rates, and underground mileage completed within the 2019-2022 time period were analyzed. Specifically, the effectiveness of undergrounding was measured by taking total CPUC-reportable ignitions associated with underground and dividing by total ignitions. Based on this analysis, strategic undergrounding is estimated to have reduced ignitions by 0.67 ignitions and mitigated PSPS impacts to approximately 7,192 customers through 2022.

Risk Reduction Estimation for the Strategic UG Program	
Pre-mitigation risk events per 100 miles HFTD (2015-2019)	18.1
Undergrounding effectiveness	98%
Ignition rate in HFTD	3.42%
Miles of mitigation in HFTD (2019-2022)	109.5
Per Mile Baseline	100
Ignitions reduced in HFTD (2019-2022)	(109.5/100)*18.1*3.42%*98% = 0.67

L. Distribution Overhead System Hardening

Year	Units (miles)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	123	$124,654	$1,587	$114,399	$5,307	$10,255	$(3,720)
2020	99.5	$137,412	$3,370	$54,759	$5,448	$82,653	$(2,077)
2021	100	$96,479	$2,401	$56,516	$5,414	$39,963	$(3,013)
2022	23.6	$22,253	$3,358	$57,986	$5,134	$(35,732)	$1,776
Total	**346.1**	**$380,799**	**$10,716**	**$283,660**	**$21,302**	**$97,139**	**$(10,586)**

1. Initiative Description

The Overhead (OH) Traditional Hardening program is focused on hardening SDG&E's overhead distribution facilities within the HFTD Tier 3, Tier 2, and the WUI by implementing overhead solutions focused on reduction of fire risk. The primary objective of this program is to replace the older bare conductor with a new, stronger bare conductor consisting of Aluminum Core Steel Reinforced (ACSR) or Aluminum Wire Aluminum Core (AWAC). Historically the predominant bare conductor that was replaced consisted of small copper wire (#8, #6, #4 single and three strand copper), which was determined to be the highest risk wire asset, oldest and most predominant in our fire prone areas. Other activities are performed simultaneously and may include: replacing wood poles to steel; replacing wood crossarms with fiberglass; replacing insulators with new polymer insulators; replacing guys and anchors; replacing aged or open wire secondary; replacing aged switches, transformers, regulators, and fuses; replacement of a small section of underground related to riser poles; and in some cases, permanent removal of poles, wires, equipment, guys, and anchors when possible.

SDG&E’s Distribution Overhead System Hardening program combines SDG&E’s early overhead hardening programs, formerly known as Fire Risk Mitigation (FiRM), Pole Risk Mitigation Engineering (PRiME), and Wire Safety Enhancement (WiSE) into one program. The consolidation of these hardening programs involved a strategy evolution compared to SDG&E’s 2019 GRC and is consistent with SDG&E’s 2022 WMP Update. Early projects were scoped based on specific wire, or at risk poles. With the execution of SDG&E’s WMP, the company shifted to the execution of projects based on a circuit-by-circuit approach that weighed risk inputs alongside

the need to reduce PSPS impacts. Ultimately combining overhead distribution hardening programs into one program streamlined the engineering, design, construction, and management of the projects and minimized impacts to customers during job walks, construction, and post-construction close-out activities.

2. Initiative Impact

To determine the estimated ignition reduction for overhead system hardening, data on average historical pre-mitigation risk events, mitigation effectiveness, historical ignition rates, and the amount of overhead hardening planned to be completed in the 2019-2022 timeframe was analyzed. Based on this analysis, the Distribution Overhead System Hardening Program is estimated to have reduced ignitions by 0.69 ignitions from 2019-2022.

Risk Reduction Estimation for the OH System Hardening Program	
Pre-mitigation risk events per 100 miles HFTD (2015-2019)	18.1
Post-mitigation risk events per 100 miles HFTD (2015-2019)	4.87
Ignition rate in HFTD (2015-2019)	3.42%
Risk events reduced HFTD (2015-2019)	13.27
Miles of mitigation in HFTD (2019-2022)	346.1
Per Mile Baseline	100
Effectiveness estimate HFTD	44%
Ignitions reduced in HFTD (2019-2022)	(346.1/100)*13.27*3.42%*44% = 0.69

M. Transmission Overhead System Hardening – Distribution Underbuilt

Year	Units (miles)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	10	$3,160	-	$2,003	-	$1,157	-
2020	9.4	$5,386	-	$494	-	$4,892	-
2021	3	$5,731	-	$510	-	$5,221	-
2022	0.6	$3,574	-	$523	-	$3,051	-
Total	**23**	**$17,851**	**-**	**$3,530**	**-**	**$14,321**	**-**

1. Initiative Description

SDG&E operates and maintains approximately 1,995 miles of transmission infrastructure, including 994 miles of overhead transmission infrastructure in the HFTD. Aging infrastructure makes lines more suspectable to equipment failures and outdated design techniques make these lines more vulnerable to foreign object in line contacts during high winds, all of which could lead

to ignitions. SDG&E is hardening the transmission system by utilizing enhanced design criteria to replace wood poles with steel poles, replace aging conductors with high strength conductors, and increase conductor spacing in the HFTD to reduce the chance of risk events and ignitions. The costs associated with this area are limited only to the distribution underbuilt components of the transmission hardening work. It is estimated that the hardening of the distribution underbuild components will achieve the same risk reduction as the traditional hardening of distribution infrastructure. The risk events and ignitions are estimated to be reduced by 45% after hardened.

These projects increase service reliability of the transmission system during extreme weather conditions and to reduce the risk of ignition associated with the electric transmission system and distribution underbuild in SDG&E HTFD territory.

2. Initiative Impact

To determine the estimated ignition reduction for transmission overhead system hardening of distribution underbuilt, data on average historical risk events, average ignition rates, the measured effectiveness of hardened distribution lines, and the amount of hardening completed in the 2019-2022 timeframe was analyzed. Utilizing this methodology, a reduction of 0.056 ignitions was estimated.

Risk Reduction Estimation for the OH Transmission-Dist. Underbuilt Program	
Numbers of Faults Prior Mitigation (2015-2019)	18.1
Numbers of Faults After Mitigation (2015-2019)	4.87
Numbers of Average HFTD Faults (2015-2019)	423.4
Numbers of Total HFTD Faults (2015-2019)	350.6
Average HFTD Faults Prior Mitigation (2015-2019)	18.1*423.4/350.6 = 21.9
Average HFTD Faults After Mitigation (2015-2019)	4.87*423.4/350.6 = 5.88
Historical Ignition Rate	3.42%
Numbers of Ignitions before Migration (2015-2019)	21.9 * 3.42% = 0.75
Numbers of Ignitions after Migration (2015-2019)	5.88*3.42% = 0.2
Total Ignition Reduction by Hardening (2015-2019)	0.75-0.2 = 0.55

Risk Reduction Estimation for the OH Transmission-Dist. Underbuilt Program	
Installation/Repairment/Replacement (2019-2022)	23

Per Mile Baseline	100
Effectiveness Estimate	44%
Total Ignition Reduced (2019-2022)	(23/100)*0.55*44% = 0.056

N. Cleveland National Forest Fire Hardening

Year	Units (miles)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	60.1	$53,715	-	$45,003	-	$8,712	-
2020	65.3	$81,047	$4	$12,384	-	$68,664	$4
2021	7	$11,722	$245	$12,781	-	$(1,059)	$245
2022	0	$1,236	$2,208	$13,113	-	$(11,877)	$2,208
Total	**132.4**	**$147,721**	**$2,456**	**$83,281**	**-**	**$64,440**	**$2,456**

1. Initiative Description

The CNF project design was based on various recommendations addressing fire prevention and the U.S. Forest Service's environmental requests. Using an analytical matrix reflecting elements of fire risks and environmental concerns, SDG&E and the U.S. Forest Service collaborated to determine which sections of the electric system should be upgraded. Each segment required a custom solution based on many factors, including the location of the customer being served by the distribution system, the topography of the land, and various biological, cultural, and environmental factors. Because of the known local wind conditions, the grid hardening activities were designed to handle the higher wind speeds and utilize increased wire spacing to decrease the likelihood of wire-to-wire contact or arcing as the result of contact by flying debris.

The CNF projects include the hardening of facilities and select undergrounding of several existing 12 kV and 69 kV electric facilities spread throughout an approximately 880 square-mile area in the eastern portion of San Diego County located in the HFTD. The existing electric lines located within CNF also extend outside of CNF boundaries. Generally, the CNF program will increase the safety and reliability of SDG&E's system by hardening existing electric infrastructure that currently serves the U.S. Forest Service, emergency service facilities (*i.e.*, fire, communication, and other), campgrounds, homes, businesses, and other customers with the CNF and surrounding areas.

The CNF Fire Hardening projects were completed in 2021, but environmental restoration costs continued through 2022. Final restoration activities for the Cleveland National Forest Power Line Replacement projects as required by the Mitigation Monitoring, Reporting, and Compliance Program (MMRCP).

2. Initiative Impact

To estimate the ignitions reduced for the 2019-2022 timeframe, data on average historical risk events, average ignition rates, measured effectiveness of hardened distribution lines, and the amount of hardening completed as part of the CNF Project were analyzed. For the distribution components, historical information used for distribution hardening was applied to the miles of distribution that were planned for completion as part of the CNF Project. For the distribution underground component of the CNF Project, the same historical pre-mitigation failure and ignition rates were used and the underground effectiveness calculation discussed in strategic undergrounding was leveraged. Utilizing this methodology, a reduction of 0.83 distribution ignitions was estimated.

Risk Reduction Estimation for the CNF OH System Hardening Program	
Pre-mitigation risk events per 100 miles HFTD (2015-2019)	18.1
Post-mitigation risk events per 100 miles HFTD (2015-2019)	4.87
Ignition rate in HFTD (2015-2019)	3.42%
Risk events reduced HFTD (2015-2019)	13.27
Miles of mitigation in HFTD (2019-2022)	55.2
Per Mile Baseline	100
Effectiveness estimate HFTD	44%
Ignitions reduced in HFTD (2019-2022)	(55.2/100)*13.27*3.42%*44% = 0.69

Risk Reduction Estimation for the CNF UG Program	
Pre-mitigation risk events per 100 miles HFTD	18.1
Effectiveness Estimate	98%
Distribution Ignition Rate HFTD	3.42%

Risk Reduction Estimation for the CNF UG Program	
Miles of mitigation HFTD	23.1

Per Mile Baseline	100
Ignitions reduced	(23.1/100)*18.1*98%*3.42%=0.141

O. Distribution Communications Reliability Improvements

Year	Units (stations)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	0	$8,176	-	$56,738	-	$(48,562)	-
2020	15	$35,897	-	$13,347	-	$22,551	-
2021	10	$50,131	-	$13,706	-	$36,426	-
2022	21	$46,206	$715	$13,999	-	$32,207	$715
Total	**46**	**$140,411**	**$715**	**$97,789**	**-**	**$42,622**	**$715**

1. Initiative Description

The current communication system within the HFTD does not have the bandwidth to support some of the technologies deployed as wildfire mitigations, including the Advanced Protection Program and Falling Conductor Protection. These programs require high-speed data communication between field devices to operate quickly, de-energizing a circuit before a broken conductor can reach the ground, reducing the safety and wildfire risk associated with energized wire-down events. In addition, there are gaps in coverage of third-party communication providers in the rural areas of eastern San Diego County that limit the ability to communicate with field personnel during Red Flag Crew deployments and EOC activations. Without adequate communication and data transmission speed, many wildfire mitigation technologies may be compromised or rendered unusable. The DCRI program and associated upgraded communication infrastructure will enhance the overall reliability of SDG&E's communication network, further enabling critical fire prevention and public safety programs. The ability to reliably enable and disable sensitive settings, enable or disable reclosing, or remotely operate a switch during a high-risk weather event requires reliable communication that the DCRI program will provide.

A privately owned LTE network in the service territory will yield significant benefits both to reliability and wildfire mitigation, these include:

- Enable Falling Conductor Protection and other Advanced Protection initiatives.
- Allow for reliable communication with sectionalizing devices utilized during PSPS events.

- Provide enhanced cybersecurity capabilities.
- Reduce cybersecurity risk.
- Apply enhanced failover and redundancy capabilities and yield high availability and reliability.
- Provide forward-looking technology lifecycle with global adoption.
  Provide solutions that are upgradable over time and adaptable for new utility use cases and requirements.

2. Initiative Impact

This initiative does not have a direct impact on reducing ignitions because it is foundational to supporting other wildfire mitigation efforts. DCRI allows for the deployment of Falling Conductor Protection and other Advanced Protection initiatives and allows for reliable communication with sectionalizing devices during PSPS events.

P. Lightning Arrestor Replacements

Year	Units (arrestors)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	0	-	-	-	-	-	-
2020	0	$20	-	-	-	$20	-
2021	1789	$2,092	$11	-	-	$2,092	$11
2022	2710	$3,444	$17	-	-	$3,444	$17
Total	**4,499**	**$5,556**	**$28**	**-**	**-**	**$5,556**	**$28**

1. Initiative Description

Lightning arresters are pieces of electrical equipment designed to mitigate the impact of transient overvoltage on the electric system. If the overvoltage duration is too long or too high, the arrester can become thermally overloaded, causing these units to fail in a way where they can become an ignition source.

The Lightning Arresters Replacement Program installs CAL FIRE-approved lightning arresters to mitigate the impact of transient overvoltage on the electric system. CAL FIRE-approved lightning arresters are equipped with an external device that operates prior to the arrester overloading, reducing the potential of becoming an ignition source.

2. Initiative Impact

The ignitions reduced through 2022 was calculated using the five-year average risk events caused by lightning arrestors, the five-year average ignitions caused by lightning arrestors, the assumed effectiveness of 80 percent, and the number of lightning arrestor installations completed. The mitigation will have an estimated 80 percent reduction in ignitions based on the technology and what the product is designed to accomplish. Based on this data, a reduction of ignitions in the HFTD is estimated as 0.0295 ignitions between 2019 and 2022.

Risk Reduction Estimation for Lightning Arrestor Replacement	
Pre-mitigation ignitions HFTD (5-year average) (2015-2019)	0.6
Effectiveness	80%
Ignitions reduced HFTD (2015-2019)	0.6*80% = 0.48
Total Arrestors HFTD (2019-2022)	73000
Arrestors installed HFTD (2019-2022)	4499
Ignitions reduced HFTD (2019-2022)	0.48*(4499/73000) = 0.0295

Q. Avian Mitigation

Year	Units (poles)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	0	-	-	$1,103	-	$(1,103)	-
2020	0	$1	-	$950	-	$(950)	-
2021	0	$244	-	$981	-	$(737)	-
2022	973	$1,944	$17	$1,006	-	$937	$17
Total	**973**	**$2,189**	**$17**	**$4,041**	**-**	**$(1,852)**	**$17**

1. Initiative Description

The Avian Protection Program involves installing avian protection equipment on distribution poles in the service territory to prevent electrocution of birds and to facilitate compliance with Federal and State Laws. The Program is aimed at improving reliability and reducing the risk of faults and wire-down events associated with avian contact that can lead to ignitions. Avian protection equipment was installed concurrently with other asset replacement initiatives across the HFTD such as hot line clamp replacements, fuse replacements, and lightning arrester replacements.

2. Initiative Impact

The estimated percent reduction in wildlife ignitions due to the installation of avian covers is 90 percent. This is based on subject matter expertise and field observations in the HFTD.

The ignitions reduced through 2022 was calculated using the 5-year average risk events caused by animal contact, the 5-year average ignitions caused by animal contacts, and number of completed Avian Protection installations in the 2019-2022 timeframe. Based on this data, a reduction of 0.000145 ignitions in the HFTD is estimated through 2022.

Risk Reduction Estimation for Avian Covers	
Animal Contact HFTD - 5 yr avg (2015-2019)	42
Animal Contact 5 yr avg Ignition HFTD (2015-2019)	0.6
5 Yr Avg Ignition Rate HFTD (2015-2019)	0.6/42 = 0.0143
Total Avian Protection In The Network HFTD (2019-2022)	86530
Avian Protection actuals to be repaired or replaced HFTD 2019-2022)	973
Mitigation Effectiveness	90%
Ignition Reduced HFTD (2019-2022)	0.0143*(973/86530)*90% = 0.000145

V. ASSET MANAGEMENT AND INSPECTIONS

Asset Management and Inspections: 2019-2022 totals ($000)						
Initiative	**Actual Capital**	**Actual O&M**	**Authorized Capital**	**Authorized O&M**	**Differential Capital**	**Differential O&M**
Detailed Inspections of Distribution Equipment	$37,139	$4,630	$42,736	$50,628	$(5,596)	$(45,998)
Detailed Inspections of Transmission Equipment	$2,594	-	$2,369	-	$225	-
Infrared Inspections of Distribution Infrastructure	-	$577	-	-	-	$577
Intrusive Pole Inspections	$5,092	$2,987	-	-	$5,092	$2,987

Asset Management and Inspections: 2019-2022 totals ($000)						
Initiative	**Actual Capital**	**Actual O&M**	**Authorized Capital**	**Authorized O&M**	**Differential Capital**	**Differential O&M**
HFTD Tier 3 Inspections	$8,959	-	-	-	$8,959	-
Drone Assessments of	$80,809	$137,446	-	-	$80,809	$137,446

Distribution Infrastructure						
Circuit Ownership	$713	-	-	-	$713	-
Patrol Inspections of Distribution Equipment	$4,030	-	-	-	$4,030	-
Total	**$139,338**	**$145,641**	**$45,105**	**$50,628**	**$94,233**	**$95,013**

SDG&E's asset management and inspection programs are designed to promote safety for the general public, SDG&E personnel, and contractors by providing a safe operating and construction environment while maintaining system reliability. Inspection and maintenance programs identify and repair conditions and components to reduce potentially defective equipment on the electric system, minimizing hazards and maintaining system reliability. These programs continue to identify ways to improve the safety of the electric system. This includes developing new programs such as the evolving Drone Investigation Assessment and Repair (DIAR) Program and supplementing existing programs such as patrol and detailed inspections with non-routine, risk-informed inspections.

SDG&E implements comprehensive, multi-faceted transmission and distribution inspection and patrol programs. These programs consist of detailed inspections, visual patrols, infrared inspections, and other various specialty patrols, inspections, and assessments. Inspections and patrols of all structures, attachments, and conductor spans are performed to identify facilities and equipment that may not meet Public Resources Code Sections 4292 and 4293 or GO 95 rules.

A. Detailed Inspections of Distribution Equipment

Year	Units (inspections)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	16329	$9,366	$568	$9,404	$12,197	$(39)	$(11,629)
2020	17977	$8,806	$897	$10,783	$12,519	$(1,977)	$(11,622)
2021	22354	$9,882	$1,744	$11,129	$12,828	$(1,247)	$(11,084)
2022	17935	$9,085	$1,421	$11,419	$13,083	$(2,333)	$(11,662)
Total		**$37,139**	**$4,630**	**$42,736**	**$50,628**	**$(5,596)**	**$(45,998)**

1. Initiative Description

GO 165 requires SDG&E to perform a service territory-wide inspection of its electric distribution system, generally referred to as the Compliance Maintenance Program (CMP). The CMP helps mitigate wildfire risk by providing additional information about the condition of the electric distribution system, including the HFTD. With this information, potential infractions can be addressed before they develop into issues or failures that may result in ignition.

GO 165 establishes inspection cycles and record-keeping requirements for utility distribution equipment. In general, utilities must patrol their systems once a year in urban areas and in Tier 2 and Tier 3 of the HFTD. In addition to patrols, utilities must conduct detailed inspections at a minimum of every 5 years for overhead structures and sub-equipment. The 5-year detailed inspections of overhead facilities are mandated by GO 165. Additionally, SDG&E prioritizes detailed inspections in the HFTD prior to fire season. The inspections themselves and the corrective work resulting from detailed inspections is captured within this initiative.

2. Initiative Impact

The impact of detailed inspections of distribution equipment is calculated utilizing a five-year historical average of hit rates (number of issues found at a given priority level divided by total inspections) that was calculated and utilized to forecast future years based on the number of inspections in the HFTD. Failure rate calculations (*i.e.*, how many risk events would occur within a year if there were no inspections or repairs within the prescribed timeframes) are calculated and utilized to convert issues found into risk events. Finally, the average distribution ignition rate

within the HFTD was utilized to calculate ignitions avoided due to the program. For 2019-2022, an estimated 5.44 ignitions would occur if inspections and repairs were not completed in the prescribed timeframes as part of the 5-year detailed distribution inspection program.

Risk Reduction Estimation for CMP	
5-year average hit rate Emergency (0-3 days) (2015-2019)	0.0020
5-year average hit rate Priority (4-30 days) (2015-2019)	0.00074
5-year average hit rate Non - Critical (2015-2019)	0.060
Fail Rate Emergency (2015-2019)	100.0%
Fail Rate Priority (2015-2019)	17.64%
Fail Rate Non-Critical (2015-2019)	1.47%
Inspection Total Findings HFTD (2019-2022)	63+104+5284 = 5451
Risk events Avoided HFTD (2019-2022)	(63*100%) + (104*17.64%) + (5284*1.47%) = 159.
Distribution Ignition rate HFTD	3.42%
Ignitions Avoided HFTD (2019-2022)	159*3.42% = 5.44

B. Detailed Inspections of Transmission Equipment (Distribution Underbuild)

Year	Units (inspection of structures)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	37*	$447	-	$674	-	$(228)	-
2020	2679	$961	-	$548	-	$412	-
2021	1957	$458	-	$566	-	$(108)	-
2022	2323	$729	-	$581	-	$148	-
Total	**n/a**	**$2,594**	**-**	**$2,369**	**-**	**$225**	**-**

*Unit type in 2019 was reported as number of transmission lines inspected.

1. Initiative Description

GO 165 requires SDG&E to perform a service territory-wide inspection of its electric transmission system, generally referred to as the CMP. The CMP helps mitigate wildfire risk by providing additional information about the condition of the electric transmission system, including the HFTD. With this information, potential infractions can be addressed before they develop into issues.

For detailed inspections, experienced internal linemen (patrollers) physically visit every structure scheduled for the year, looking at all components of the structure and conductor. By physically visiting the structures, patrollers can assess each structure for current and future

maintenance requirements. As conditions are identified, internal severity codes are assigned to ensure supervisors properly prioritize assessment of conditions found. This prioritization considers the component identified, the location of the structure and surrounding terrain, and the severity of the condition. It also ensures that conditions are corrected in timeframes that meet or exceed GO 95 requirements. Detailed inspections are currently completed on a 3-year cycle for all overhead structures, including those in the HFTD. Inspections are prioritized and scheduled based on safety, reliability, and operational need. The costs associated with this initiative include any distribution underbuilt related corrective work resulting from the detailed inspections.

2. Initiative Impact

The impact of detailed inspections of transmission equipment is calculated utilizing a five-year historical average of hit rates (number of issues found at a given priority level divided by total inspections) that was calculated and utilized to forecast future years based on the number of inspections in the HFTD. Failure rate calculations (*i.e.*, how many risk events would occur within a year if there were no inspections or repairs within the prescribed timeframes) are calculated and utilized to convert issues found into risk events. Finally, the average transmission ignition rate within the HFTD was utilized to calculate ignitions avoided due to the program. For 2019-2022, an estimated 5.08 ignitions would occur if inspections and repairs were not completed in the prescribed timeframes as part of the transmission detailed inspection program.

Risk Reduction Estimation for Transmission Inspection and Maintenance Programs	
5-year average hit rate Emergency (0-3 days) (average 2015 -2019)	0.000179
5-year average hit rate Priority (4-30 days) (average 2015 -2019)	0.0118
5-year average hit rate Non - Critical (average 2015 -2019)	0.0775
Fail Rate Emergency (average 2015 -2019)	176.4%
Fail Rate Priority (average 2015 -2019)	17.64%
Fail Rate Non-Critical (average 2015 -2019)	1.47%
Inspection Total HFTD (2019-2022)	0+294+1081 = 1375
Risk events Avoided HFTD (2019-2022)	(0*176.4%) + (294*17.64%) + (1081*1.47%) = 67.76
Transmission Ignition rate HFTD	7.5%
Ignitions Avoided HFTD (2019-2022)	67.7523*7.5% = 5.08

C. Infrared Inspections of Distribution Infrastructure

Year	Units (inspections)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	0	-	$98	-	-	-	$98
2020	13077	-	$175	-	-	-	$175
2021	17068	-	$146	-	-	-	$146
2022	12264	-	$159	-	-	-	$159
Total	42,409	-	$577	-	-	-	$577

1. Initiative Description

Distribution Infrared Inspections utilize infrared technology to examine the radiation emitted by connections to determine if there are potential issues with a connection before failure. The scope of this program includes approximately 12,000 distribution structures each year. Thermographers perform ground inspections to capture and assess thermal imagery that may indicate an abnormality on the system. Findings are documented and required repair work is tracked through completion. The inspections themselves and the corrective work resulting from infrared inspections is captured within this initiative.

2. Initiative Impact

The impact of infrared inspections of distribution equipment is calculated utilizing a historical average of hit rates (number of issues found at a given priority level divided by total inspections) that was calculated and utilized to forecast future years based on the number of inspections in the HFTD. Failure rate calculations (*i.e.*, how many risk events would occur within a year if there were no inspections or repairs within the prescribed timeframes) are calculated and utilized to convert issues found into risk events. Finally, the average distribution ignition rate within the HFTD was utilized to calculate ignitions avoided due to the program. For 2019-2022, an estimated 0.036 ignitions would occur if inspections and repairs were not completed as part of the distribution infrared inspection program.

Risk Reduction Estimation for Distribution Infrared Inspection	
Fail Rate Emergency (average 2015 -2019)	176.4%
Fail Rate Priority (average 2015 -2019)	17.64%

Risk Reduction Estimation for Distribution Infrared Inspection	
Fail Rate Non-Critical (average 2015 -2019)	1.47%
Inspection Total HFTD (2019-2022)	0+4+23 = 27
Risk events Avoided HFTD (2019-2022)	(0*176.4%) + (4*17.64%) + (23*1.47%) = 1.04
Distribution Ignition rate HFTD	3.42%
Ignitions Avoided HFTD (2019-2022)	1.0437*3.42% = 0.036

D. Intrusive Pole Inspections

Year	Units (inspection of structures)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	19729	$638	$1,256	-	-	$638	$1,256
2020	14450	$600	$886	-	-	$600	$886
2021	8721	$2,008	$806	-	-	$2,008	$806
2022	967	$1,846	$39	-	-	$1,846	$39
Total	**43,867**	**$5,092**	**$2,987**	**-**	**-**	**$5,092**	**$2,987**

1. Initiative Description

GO 165 requires all wood poles over 15 years of age to be intrusively inspected within 10 years and all poles which previously passed intrusive inspection to be inspected intrusively again on a 20-year cycle. Distribution wood pole intrusive inspections are performed on a 10-year cycle.

An intrusive inspection typically involves an excavation around the pole base and/or a sound and bore of the pole at ground-line. Depending on the cavities found or the amount of rot observed, an estimate of the remaining pole strength is determined utilizing industry-wide standards. Depending on the severity of the deterioration, the pole either passes inspection with greater than 80 percent strength remaining or is replaced. The inspections themselves and the corrective work for replacement is captured within this initiative.

Distribution Wood Pole Intrusive inspections are currently performed on a 10-year cycle. Non-routine intrusive inspections may occur when current pole strength (percent strength remaining) information is needed for pole loading calculations during design work per GO 95.

2. Initiative Impact

The impact of wood pole intrusive inspections is calculated utilizing a historical average of hit rates (number of issues found at a given priority level divided by total inspections) that was calculated and utilized to forecast future years based on the number of inspections in the HFTD. Failure rate calculations (*i.e.*, how many risk events would occur within a year if there were no inspections or repairs within the prescribed timeframes) are calculated and utilized to convert issues found into risk events. Finally, the average distribution ignition rate within the HFTD was utilized to calculate ignitions avoided due to the program. For 2019-2022, an estimated 1.2 ignitions would occur if inspections and repairs were not completed as part of the wood pole intrusive inspection program.

Risk Reduction Estimation for Wood Pole Intrusive Inspection Program	
Fail Rate Emergency (average 2015 -2019)	100%
Fail Rate Priority (average 2015 -2019)	17.64%
Fail Rate Non-Critical (average 2015 -2019)	1.47%
Inspection Total HFTD (2019 -2022)	23.34 + 26.45 + 476.24 = 526
Risk events Avoided HFTD (2019 -2022)	(23.34*100%) + (26.45*17.64%) + (476.24*1.47%)= 35
Distribution Ignition rate HFTD	3.42%
Ignitions Avoided HFTD (2019 -2022)	35*3.42% = 1.2

E. HFTD Tier 3 Inspections

Year	Units (inspections)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	11864	$1,405	-	-	-	$1,405	-
2020	11535	$1,321	-	-	-	$1,321	-
2021	12268	$3,247	-	-	-	$3,247	-
2022	12263	$2,986	-	-	-	$2,986	-
Total	**47,930**	**$8,959**	**-**	**-**	**-**	**$8,959**	**-**

1. Initiative Description

SDG&E has implemented an HFTD Tier 3 Inspection program to perform Quality Assurance/Quality Control (QA/QC) inspections within the HFTD Tier 3 prior to fire season. These additional proactive inspections are scheduled on a three-year cycle, in addition to the GO

165 five-year detailed inspections, exceeding the requirements of GO 165. These additional inspections are designed to identify potential structural and mechanical problems before they fail. SDG&E has performed HFTD Tier 3 Inspections of its overhead electric distribution poles in high-risk fire areas with a focus on identifying areas where maintenance would improve fire safety and reliability, with a goal of mitigating the probability that SDG&E's overhead electric system, facilities, and equipment would be the source of ignition for a fire.

These inspections were conducted from 2010 through 2016 as a result of a settlement agreement adopted in D.10-04-047. In 2017, SDG&E decided to proactively continue the HFTD Tier 3 Inspections as part of its normal program. In 2018, when the CPUC adopted the current statewide fire threat map, SDG&E began applying the QA/QC three-year inspection cycle to the newly defined HFTD Tier 3. SDG&E performs HFTD Tier 3 Inspections on an average of 11,000 poles annually (approximately one-third of the distribution poles in the HFTD Tier 3.

2. Initiative Impact

The impact of HFTD Tier 3 inspections is calculated utilizing a historical average of hit rates (number of issues found at a given priority level divided by total inspections) that was calculated and utilized to forecast future years based on the number of inspections in the HFTD. Failure rate calculations (*i.e.*, how many risk events would occur within a year if there were no inspections or repairs within the prescribed timeframes) are calculated and utilized to convert issues found into risk events. Finally, the average distribution ignition rate within the HFTD was utilized to calculate ignitions avoided due to the program. For 2019-2022, an estimated 2.37 ignitions would occur if inspections and repairs were not completed as part of the HFTD Tier 3 inspection program.

Risk Reduction Estimation for HFTD Tier 3 Distribution Pole Inspection Program	
Fail Rate Emergency (average 2015 -2019)	100.0%
Fail Rate Priority (average 2015 -2019)	17.64%
Fail Rate Non-Critical (average 2015 -2019)	1.47%

Risk Reduction Estimation for HFTD Tier 3 Distribution Pole Inspection Program	
Inspection Total HFTD (2019-2022)	18+183+1294 = 1495
Risk events Avoided HFTD (2019-2022)	(18*100%) + (183*17.64%) + (1294*1.47%) = 69.3
Distribution Ignition rate HFTD	3.42%
Ignitions Avoided HFTD (2019-2022)	69.3*3.42% = 2.37

F. Drone Assessments of Distribution Infrastructure

Year	Units (inspections)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	37310	$274	$13,557	-	-	$274	$13,557
2020	21420	$16,145	$45,964	-	-	$16,145	$45,964
2021	22000	$12,903	$33,170	-	-	$12,903	$33,170
2022	30044	$51,488	$44,755	-	-	$51,488	$44,755
Total	**110,774**	**$80,809**	**$137,446**	**-**	**-**	**$80,809**	**$137,446**

1. Initiative Description

Improving identification methods for potential fire hazards on distribution facilities can serve to minimize the risk of wildfire ignition and faults that cause outages. SDG&E began a pilot program at the end of 2019 to determine whether the use of drone technology could help improve or enhance its existing inspection efforts in the HFTD. Specifically, SDG&E was interested in determining whether drones and the high-resolution imagery captured by the drones could be used to identify issues that could not be or were difficult to identify from the ground during traditional inspections.

SDG&E prioritized the drone inspections within the HFTD starting with Tier 3 in 2020 and moving into Tier 2 in 2021 and 2022, with the goal of completing inspections for all HFTD structures within the three-year period. An analysis of the data collected by the drone program concluded that the program found a higher percentage of total issues than current inspection programs. The top issues that were found significantly more by the drone program included: damaged arrestors, damaged insulators, issues with pole top work, issues with armor rods, crossarm or pole top damage, exposed connections, loose hardware, improper splices, and damaged conductor, damaged transformer and Communication Infrastructure Provider (CIP) connection issues.

For the DIAR Program, the rate at which issues were found is significantly higher than the 5-year average of ground-based inspections. This was expected as the program evaluates infrastructure, at a high level of detail, from the top-down as opposed to the bottom-up method of traditional inspections.

The imagery collected by the drones does allow for improved identification of potential fire hazards for certain types of issues or where conditions such as terrain and vegetation density present difficulties in completing full detailed inspections. Additionally, the number of images (over 1 million) being captured during the pilot drone program highlighted the need to review the drone image data more efficiently in the future. As the amount of data coming into SDG&E's system increases, the ability for humans to review all the data would become impossible, costly, and burdensome. Therefore, SDG&E began using intelligent image processing (*i.e.*, machine learning or artificial intelligence) technology to process large amounts of data and focus human resources on potential issues. As models are finalized, SDG&E could potentially be able to process thousands of images in real-time or in a fraction of what it would take for a qualified electrical worker (QEW) to review. SDG&E's intelligent image processing models now in development include 25 models detecting 15 asset variations and 12 damage conditions within a range of 65-97% accuracy. These models are generally associated with the pole, crossarm, insulator, and transformer. SDG&E has invested approximately $2 million in the development of these models and intends to continue refining the current models and building additional models to eventually allow for a full evaluation of the pole, depending on the images provided.

2. Initiative Impact

The impact of DIAR inspections is calculated utilizing a historical average of hit rates (number of issues found at a given priority level divided by total inspections) that was calculated and utilized to forecast future years based on the number of inspections in the HFTD. Failure rate

calculations (*i.e.*, how many risk events would occur within a year if there were no inspections or repairs within the prescribed timeframes) are calculated and utilized to convert issues found into risk events. Finally, the average distribution ignition rate within the HFTD was utilized to calculate ignitions avoided due to the program. For 2019-2022, an estimated 45.9 ignitions would occur if inspections and repairs were not completed as part of the DIAR inspection program.

Risk Reduction Estimation for the DIAR Program (Distribution	
Fail Rate Emergency (average 2015 -2019)	100.0%
Fail Rate Priority (average 2015 -2019)	17.64%
Fail Rate Non-Critical (average 2015 -2019)	1.47%
Inspection Total HFTD (2019-2022)	284 + 4368 + 19589 = 24241
Risk events Avoided HFTD (2019-2022)	(284*100%) + (17.64%*4368) + (1.47%*19589) = 1342.47
Distribution Ignition rate HFTD	3.42%
Ignitions Avoided HFTD (2019-2022)	1342.47*3.42% = 45.9

G. Circuit Ownership

Year	Units (n/a)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	n/a	$672	-	-	-	$672	-
2020	n/a	$41	-	-	-	$41	-
2021	n/a	-	-	-	-	-	-
2022	n/a	-	-	-	-	-	-
Total	**n/a**	**$713**	**-**	**-**	**-**	**$713**	**-**

1. Initiative Description

The Circuit Ownership platform relied upon field personnel expertise to identify potential hazards that could lead to wildfire. This initiative helped reduce the risk of potential fire hazards turning into ignitions by identifying concerns and mitigating them before they fail. This platform gave SDG&E's field personnel another avenue to submit these concerns via a Mobile Data Terminal (MDT) program or mobile application (both iOS and Android). Specifically, this program facilitated supplemental submission of circuit vulnerabilities (in addition to the existing inspection programs) so that they can be repaired in a timely fashion, to prevent a potential ignition and minimize the risk of wildfire.

SDG&E's mobile application enables all employees to submit supplemental inspections if they see an issue with SDG&E assets that needs to be addressed. When issues are identified

through the mobile application, they are categorized within two days (unless identified as an imminent danger or hazard) as either a priority, emergency, or non-emergency. This prioritizes the prompt follow up of those priority and emergency submissions. For example, a submission through this program identified a long stretch of overhead wire (sized #6 bare stranded copper) that runs through a dry brush canyon near an urban development. This branch line feeds a small transformer that is used for monitoring. Once the issue was identified, the Circuit Ownership program developed a plan to isolate the transformer "off grid" with solar and batteries, and then remove the 22-span section of overhead small conductor that has a higher risk of failure.

Ultimately, the Circuit Ownership platform created for field personnel to identify circuit vulnerabilities was proven obsolete due to the same data being captured by extensive existing and ongoing inspections including the DIAR program, QA/QC inspections, enhanced infrared inspections in HFTD, and pre- and post-PSPS-event patrols. The ability to report any additional concerns was absorbed into SDG&E's existing near miss reporting application, with a new category for items with a potential for ignition added.

2. Initiative Impact

This initiative is not directly tied to reducing a specific risk driver and directly reducing ignitions. Instead, it supports potential risk event reporting and provides an additional avenue to report conditions that may lead to ignition. Ultimately, this initiative's impact was rolled into SDG&E's existing near miss reporting application to provide one location for employees and contractors to report near miss incidents, including those with a potential for ignition.

H. Patrol Inspections of Distribution Equipment

Year	Units (inspections)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	86075	$889	-	-	-	$889	-
2020	86490	$836	-	-	-	$836	-
2021	86490	$1,202	-	-	-	$1,202	-
2022	86821	$1,104	-	-	-	$1,104	-
Total	**345,876**	**$4,030**	**-**	**-**	**-**	**$4,030**	**-**

1. Initiative Description

GO 165 requires utilities to patrol their systems annually in HFTD Tier 2 and Tier 3 and in urban areas. Patrol inspections in rural areas outside of the HFTD are required once every 2 years. However, as a long-standing practice SDG&E performs patrol inspections in all areas on an annual basis. Both the patrol inspections themselves and the corrective work are included in this initiative.

Distribution patrol inspections are currently completed on an annual basis on all structures, including those in the HFTD. Non-routine patrol inspections may occur for safety, reliability, or operational needs. For example, patrol inspections are performed on all distribution structures potentially affected by or affected by a PSPS event prior to and after the PSPS event. Additionally, patrols are prioritized in the HFTD prior to wildfire season, typically being completed by April of each calendar year.

2. Initiative Impact

The impact of patrol inspections is calculated utilizing a historical average of hit rates (number of issues found at a given priority level divided by total inspections) that was calculated and utilized to forecast future years based on the number of inspections in the HFTD. Failure rate calculations (*i.e.*, how many risk events would occur within a year if there were no inspections or repairs within the prescribed timeframes) are calculated and utilized to convert issues found into risk events. Finally, the average distribution ignition rate within the HFTD was utilized to calculate ignitions avoided due to the program. For 2019-2022, an estimated 8.1 ignitions would occur if patrols and repairs were not completed as part of the patrol inspection program.

Risk Reduction Estimation for Patrol Inspections of Distribution Equipment	
5-year average hit rate Emergency (0-3 days) (average 2015-2019)	0.00054
5-year average hit rate Priority (4-30 days) (average 2015-2019)	0.0005
5-year average hit rate Non - Critical (average 2015 -2019)	0.0038
Fail Rate Emergency (average 2015 -2019)	100.0%
Fail Rate Priority (average 2015 -2019)	17.64%
Fail Rate Non-Critical (average 2015 -2019)	1.47%
Inspection Total HFTD (2019-2022)	193+107+1614 = 1914
Risk events Avoided HFTD (2019-2022)	(193*100%) + (107*17.64%) + (1614*1.47%) = 235.6
Distribution Ignition rate HFTD	3.42%
Ignitions Avoided HFTD (2019-2022)	235.6*3.42% = 8.06

VI. VEGETATION MANAGEMENT AND INSPECTIONS

Vegetation Management and Inspections: 2019-2022 totals ($000)						
Initiative	**Actual Capital**	**Actual O&M**	**Authorized Capital**	**Authorized O&M**	**Differential Capital**	**Differential O&M**
Fuels Management	-	$22,442	-	-	-	$22,442
Pole Brushing	-	$19,691	-	$16,552	-	$3,139
LiDAR Inspections of Vegetation around Distribution Infrastructure	-	$4,152	-	-	-	$4,152
Vegetation Restoration	-	$1,265	-	-	-	$1,265
Total	**-**	**$47,550**	**-**	**$16,552**	**-**	**$30,998**

SDG&E continues to address the risk of vegetation-infrastructure contact outages and ignitions through its comprehensive Vegetation Management Program. SDG&E's WMP vegetation management initiatives span several activities including inspections, trimming and removals, fuels treatment, pole brushing, and audit. This section will discuss those activities performed outside of the Tree Trimming Balancing Account (TTBA) and included within the WMPMA.

Fuels Management is a vegetation thinning activity that entails enhanced clearing around inventoried subject poles located within the HFTD that carry hardware that are subject to pole brushing requirements in Public Resources Code Section 4292. This fuels treatment program is not regulatory-required and is a discretionary activity SDG&E performs as an additional risk mitigation. Data collected includes property location, customer information, span location, GPS coordinates, work status, and history.

SDG&E activities are reviewed for environmental and cultural impact and released to perform work by identifying any applicable constraints or restrictions to ensure species and habitat protection in accordance with environmental rules and regulations.

Vegetation Management performs a QA/QC audit (WMP.505) on a percentage of all activities. In general, a 15 percent sample is selected to be performed after activities are completed. Vegetation Management performs an audit on 100 percent of all hazard tree and tree removal activities completed which result from the off-cycle, HFTD inspection activity.

All scheduled trimming activities are recorded in the tree asset record within the electronic inventory database. Upon work completion, the tree trim records are updated with a work status (condition code) and timestamp. Tree work is issued and tracked via electronic parent SWO within each Vegetation Management Area (VMA). Contractors in turn create multiple child DWO within each SWO to distribute to the field crews. Upon completion of the field work, contractors complete the DWOs and the assigned SWOs in the database. Condition codes and dates completed are used to track and prioritize work completion at the individual tree level, and within the associated work orders. Work orders can be ascribed high priority to be completed in a more urgent timeframe.

Vegetation Management works with its contractors to determine the level of staffing required to complete all activities following the annual Master Schedule. Contractors are required to provide the necessary training to their workforce on the technical capabilities to perform the work. SDG&E collaborates externally with the San Diego Community College District, Utility Arborist Association, local International Brotherhood of Electrical Workers (IBEW) union, and other IOUs in the development and execution of a Line Clearance Arborist Training program. Should additional resources be required to address emergency work, SDG&E relies on its contractor to attain subcontracted resources and/or mutual-aid support from the neighboring utilities.

A. Fuels Management

Year	Units (poles cleared)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	324	-	$5,095	-	-	-	$5,095
2020	463	-	$5,807	-	-	-	$5,807
2021	500	-	$3,446	-	-	-	$3,446
2022	500	-	$8,094	-	-	-	$8,094
Total	**1,787**	**-**	**$22,442**	**-**	**-**	**-**	**$22,442**

1. Initiative Description

The fuels activity treatment includes the thinning of ground vegetation surrounding structures located in the HFTD where the risk of ignition and propagation is present. Specifically, vegetation is thinned in a 50-foot radius from the outside circumference of the structures down to an approximate 30 percent vegetation cover where achievable. Non-native vegetation is prioritized for thinning. The activity is also intended to protect infrastructure in the event of a wildfire. Structures that are subject to the pole clearing (brushing) requirements of PRC §4292 are targeted for fuels activity treatment. These structures are prioritized because the risk of ignition is relatively higher due to the presence of hardware that makes them subject to pole clearing.

Vegetation Management performs a risk analysis review to determine which poles will be treated under this program. The analysis includes the identification of structures where the fuels component may be conducive to ignition. The Circuit Risk Index (CRI) and WRRM are tools used to identify higher risk areas in the HFTD to prioritize and perform fuels modification activities. Aerial imagery can also be a valuable tool to further refine targeted work locations. Work locations are pre-screened for environmental impact to avoid negative impact to species.

2. Initiative Impact

This initiative is not directly tied to reducing a specific risk driver and reducing ignitions. Instead, it removes fuels from under electric infrastructure to reduce the likelihood that any fault causes an ignition and reduce the spread of fires that occur by limiting fuels.

B. Pole Brushing

Year	Units (poles)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	36563	-	$2,591	-	$3,988	-	$(1,397)
2020	35102	-	$5,435	-	$4,093	-	$1,342
2021	34000	-	$5,558	-	$4,194	-	$1,364
2022	35485	-	$6,107	-	$4,277	-	$1,830
Total	**141,150**	**-**	**$19,691**	**-**	**$16,552**	**-**	**$3,139**

1. Initiative Description

Pole brushing is a fire prevention measure involving the removal of vegetation at the base of poles that carry specific types of electrical hardware that could cause sparking or molten material to fall to the ground. The clearance requirements in Public Resources Code Section 4292 require the removal of all vegetation down to bare mineral soil within a 10-foot radius from the outer circumference of subject poles located within the boundary of the State Responsibility Area (SRA). The requirement also includes the removal of live vegetation up to 8 vertical feet and the removal of dead vegetation up to conductor level within the clearance cylinder.

Approximately 34,000 distribution poles that have non-exempt subject hardware attached are brushed annually. Inspectors determine which poles require work and update the records in the work management database. Three separately scheduled pole brush activities are performed annually, including mechanical brushing, chemical application, and re-clearing. Pole brush inspection occurs in conjunction with the tree inspection activity.

Mechanical pole brushing is the clearing all vegetation around the base of a pole down to bare mineral soil for a radius of 10 feet from the outer circumference of the pole; removing all live vegetation within the cylinder up to a height of 8 feet above ground; and removing all dead vegetation up to the height of the conductors. Mechanical brushing is typically performed in the spring months.

On poles where environmentally safe and with customer consent, contractors will apply an EPA-approved herbicide. SDG&E treats approximately 10,000 poles with a pre-emergent

herbicide to minimize vegetative re-growth and reduce overall maintenance costs. The chemical application is typically done just before the rainy season (during the fall and winter months), so the chemical is activated and effective.

Reclearing is a second mechanical activity performed on poles that are not cleared by a chemical application. During reclearing, vegetation which has grown into, or blown into, the required clearance area since the last maintenance activity is removed. The need to revisit a subject pole multiple times is not uncommon due to leaf litter cast or blown into the cleared area and vegetation regrowth that cannot controlled by mechanical or herbicide treatments.

Pole brushing follows a specific multi-activity, annual schedule to remain compliant year-round. An environmental review is performed in advance of all new pole brushing activities to assess impacts to protected species and habitat. Like all other vegetation management activities, a QA/QC audit is performed on a random, representative sample of all completed pole-brush work. Additionally, SDG&E conducts internal compliance audits for vegetation management on an annual basis.

2. Initiative Impact

To calculate the effectiveness of pole brushing in terms of ignitions prevented, SDG&E began by analyzing the 5-year historical risk event history focused on equipment failures within the HFTD that require pole brushing. Pole brushing does not prevent equipment failures, but if the energy/heat generated by a risk event occurs within the brushed area (no fuel) it is assumed an ignition is prevented. SDG&E is aware that pole brushing is not 100 percent effective as nearly 80 ignitions since 2014 have occurred near poles that have been brushed. SDG&E utilized subject matter expertise to estimate that pole brushing is 40 percent effective at reducing the ignition rate of equipment failures associated with brushed poles. This assumption leads to an estimated 1.11 ignitions avoided from pole brushing activities.

Risk Reduction Estimation for Pole Brushing Program	
HFTD equipment failures (average 2015 -2019)	122.8
Ignition rate HFTD	3.42%
Estimated effectiveness (average 2015 -2019)	40%
Pre mitigation ignitions HFTD (average 2015 -2019)	122.8*3.42% = 4.2
Ignition Reduction Estimate HFTD (average 2015 -2019)	4.2*40% = 1.68
Pole brushing actuals HFTD (2019 -2022)	93261
Total poles each HFTD (2019 -2022)	141150
Ignition reduced HFTD (2019 -2022)	(93261/141150)*1.68 = 1.11

C. LiDAR Inspections of Vegetation around Distribution Infrastructure

Year	Units (circuit line miles)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	0	-	-	-	-	-	-
2020	0	-	-	-	-	-	-
2021	0	-	$1,151	-	-	-	$1,151
2022	737.5	-	$3,001	-	-	-	$3,001
Total	737.5	-	$4,152	-	-	-	$4,152

1. Initiative Description

LiDAR inspections are utilized as a supplement to detailed ground-based inspections that can be used for conditional awareness, outage investigation, and change detection. This technology can potentially augment and enhance vegetation inspection and auditing activities by providing highly accurate clearances between trees and power lines, thus providing another tool to prevent an outage or a non-compliant condition.

In 2021 and 2022, all circuits within the HFTD had LiDAR data captured and processed. LiDAR data was used to perform vegetation risk analysis on selected circuits within the HFTD. Because the entire HFTD was captured, a large-scale LiDAR collection initiative will not be implemented again for several years. However, this LiDAR data will continue to be utilized to support pole loading calculations needed for system hardening projects such as covered conductor and traditional overhead hardening and corrective work orders involving pole or crossarm replacements.

2. Initiative Impact

This initiative is not directly tied to reducing a specific risk driver and reducing ignitions. Instead, it provides situational awareness on the distribution circuits within the HFTD and the nearby vegetation. This data can later be leveraged to understand the circuits with the greatest tree strike risk, and be utilized for PLS-CADD design of future projects involving the infrastructure.

D. Vegetation Restoration

Year	Units (n/a)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	n/a	-	-	-	-	-	-
2020	n/a	-	-	-	-	-	-
2021	n/a	-	$393	-	-	-	$393
2022	n/a	-	$873	-	-	-	$873
Total	n/a	-	$1,265	-	-	-	$1,265

1. Initiative Description

While vegetation management is necessary for both reliability and wildfire mitigation, SDG&E recognized the impact that tree removals have on the local environment. Vegetation management operations are conducted with an eye toward their environmental impacts and in accordance with all applicable rules and regulations, including protocols of the wildlife agency approved Natural Communities Conservation Plan (NCCP). As a customer service, SDG&E initiated the Right Tree Right Place program, by which customers may request and receive replacement trees that are compatible with powerlines and the local terrain. Planting utility-compatible trees improves safety, reliability, and compliance, and minimizes the probability of vegetation-related outage, ignition, and wildfires. This program has been and continues to be a component of SDG&E's tree trimming costs and tracked to the TTBA.

Trees play a vital role in our planet's overall health, providing critical ecosystem services that allow Earth's natural cycles to facilitate important carbon sinks. Climate change and wildfires threaten this relationship. In geographically diverse California, forests are facing climate risks from extreme heat, drought, and wildfires. 2020 was one of the worst years in California wildfire history, with an estimated 1.75 million acres of forest burned and approximately 90 million metric tons of carbon dioxide released from the burning of forests. According to the California Air Resources Board, our natural and working lands have now become a source of carbon emissions.

In 2021, as part of its sustainability initiative, SDG&E also introduced the Vegetation Restoration Initiative, setting a goal to plant or distribute over 10,000 trees annually. The program will mitigate tree removals focused in the HFTD through planting efforts that are largely focused in areas that are not prone to wildfire and outside the HFTD. In working towards this goal, SDG&E emphasizes planting the right tree in the right place, following the industry-established program, but expands beyond SDG&E's existing tree replacement offerings. And through this program, SDG&E also promotes additional community outreach and education regarding safe planting around utility infrastructure.

Through the Vegetation Restoration Initiative, SDG&E is enlisting nature in the fight against climate change to further the path toward net zero emissions and build resilience to climate impacts.

Tree planting can provide important resilience and health benefits to local communities. As our climate continues to change, using trees as mitigation and adaptation measures for communities will bolster resilience for many community generations to come. Tree planting improves community resilience by mitigating local air pollution and economic resilience by cooling surrounding air temperatures. These "nature-based solutions" have been embraced as means to keep communities cooler, reduce "heat-island effects," lower the risk of heat-related

illnesses and reduce energy bills. Further, trees offset the GHG emissions of catastrophic wildfires and sustainable reforestation efforts can in fact work to prevent their spread. Any trees planted by SDG&E will provide continuous improvements to air quality throughout the service territory, but planting the right trees in the right places can also provide increased local benefits such as erosion control, stormwater runoff mitigation, and improvements to water quality.

2. Initiative Impact

This initiative is not directly tied to reducing a specific risk driver and reducing ignitions. Instead, the trees planted as part of this program will provide benefits to communities including air quality, erosion control, and reduced energy bills.

VII. GRID OPERATIONS AND OPERATING PROTOCOLS

Grid Operations and Operating Protocols: 2019-2022 totals ($000)						
Initiative	**Actual Capital**	**Actual O&M**	**Authorized Capital**	**Authorized O&M**	**Differential Capital**	**Differential O&M**
Personnel Work Procedures and Training in Conditions of Elevated Fire Risk	$851	$10,527	-	$9,648	$851	$878
Aviation Firefighting Program	$32,601	$24,853	-	$26,529	$32,601	$(1,675)
Total	**$33,452**	**$35,380**	**-**	**$36,177**	**$33,452**	**$(797)**

SDG&E's grid operations and protocols consist of mitigations that reduce risk through changing the way SDG&E operates during periods of elevated and extreme wildfire risk. This includes the disabling of reclosing in the HFTD, the enabling of fast recloser settings, restricting work in the HFTD during extreme fire potential and Red Flag Warnings (RFWs), and sending contract fire resources (CFRs) with crews during elevated days in the HFTD. These operational protocols have led to reduced ignitions on the electric system and have reduced ignitions during operational periods where an ignition is more likely to lead to a catastrophic fire.

A. Personnel Work Procedures and Training in Conditions of Elevated Fire Risk

Year	Units (n/a)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	n/a	$11	$1,791	-	$2,261	$11	$(470)
2020	n/a	$663	$2,589	-	$2,320	$663	$268

2021	n/a	$176	$3,072	-	$2,439	$176	$633
2022	n/a	-	$3,075	-	$2,628	-	$447
Total	**n/a**	**$851**	**$10,527**	**-**	**$9,648**	**$851**	**$878**

1. Initiative Description

Work activities and associated fire mitigations throughout the service territory are designated for specific Operating Conditions (*e.g.*, Normal condition, Elevated condition, Extreme condition, or RFW) as outlined in the Electric Standard Practice (ESP) 113.1 (Revised).[42] As the fire potential increases in severity, activities that present an increased risk of ignition have additional mitigation requirements. Where risk cannot be mitigated, work activity might cease. All field personnel are required to be trained on SDG&E's fire prevention procedures annually. Fire prevention and safety is also discussed at pre-job briefings, commonly referred to as tailgates/tailboards, and built into standard work practice. These standard practices are not exclusive to the HFTD and are implemented in all areas of the service territory where at-risk activities are performed adjacent to wildland fuels.

When work activities reach a level of fire risk where a dedicated resource is required, SDG&E and contract personnel utilize a qualified fire resource with specific training and experience (listed in ESP 113.1). While these resources can be ordered throughout the year to meet California's year-round fire season, SDG&E takes the proactive step of supplying field crews with 12 to 17 daily resources once the fire environment and FPI begin to indicate elevated risk. This daily staffing changes from year to year but typically runs from roughly June 1 through the end of November. SDG&E also works to align with the staffing of the seasonal resources of the local, state, and federal agencies in the service territory.

These qualified resources, referred to as CFRs, are staffed by two personnel that have the appropriate amount of training, water, and tools to meet the needs of the work activity. The use of

[42] SDG&E Fire Program Manager, *Electric Standard Practice – 113.1 'SDG&E Operations & Maintenance Wildland Fire Prevention Plan*', available at https://www.sdge.com/sites/default/files/regulatory/Electric%20Standard%20Practice%20No.%20113.1_0.pdf.

CFRs is not limited to the HFTD as ESP 113.1 requires a dedicated fire patrol for specific activities when they are performed adjacent to wildland fuels and there is elevated risk. The primary missions of CFRs are fire prevention and compliance. Secondarily, because of the required training tools, the resource can take action to mitigate an ignition should it occur and communicate to the fire agencies to ensure transparent reporting. At-risk activities for which a dedicated fire patrol is utilized include but are not limited to hot work, vegetation clearing, and energized switching.

During periods of Extreme Fire Potential, SDG&E cancels regular work with at risk activities. CFRs are deployed with SDG&E personnel for emergency work and play an important role in fire prevention during the PSPS de-energization and restoration process.

2. Initiative Impact

This initiative is not directly tied to reducing a specific risk driver and reducing ignitions. Instead, by limiting the work that can be performed during elevated or extreme fire potential and by providing CFRs when performing necessary work, ignitions and the potential for those ignitions to spread is limited.

B. Aviation Firefighting Program

Year	Units (n/a)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	n/a	-	$3,859	-	$ 6,216	-	$(2,357)
2020	n/a	$7,145	$6,748	-	$6,380	$7,145	$368
2021	n/a	$13,628	$6,851	-	$6,706	$13,628	$145
2022	n/a	$11,828	$7,397	-	$7,226	$11,828	$170
Total	**n/a**	**$32,601**	**$24,853**	**-**	**$26,529**	**$32,601**	**$(1,675)**

1. Initiative Description

The Aviation Firefighting Program focuses on reducing the consequences of wildfires through suppression of fire spread. These resources are available not only for fires associated with SDG&E equipment but to the entire community regardless of the cause of ignition. Under certain conditions, a wildfire that is not suppressed may grow rapidly and uncontrollably and endanger

public safety. Fire agencies could divert local aerial resources to fight wildfires outside of the service territory, leaving the service territory with limited or no aerial firefighting resources. To mitigate this risk, the aviation firefighting program serves as a wildfire suppression resource, ensuring aerial firefighting resources remain available in the region.

Two firefighting helicopters, an Erickson S-64 helitanker (Air Crane) and a Sikorsky UH-60 Blackhawk helitanker are available. Both firefighting assets are Type 1 firefighting helicopters, defined as carrying over 700 gallons of water to fight fires. The Air Crane has the capability of dropping up to 2,650 gallons of water and the Blackhawk has the capability of dropping up to 850 gallons of water. Additionally, the Blackhawk hardware is configured for night vision device flight and is capable of night firefighting with the appropriate crew, training, and CAL FIRE support. The decision for these two resources was based on their exceptional fire suppression capability and ability to perform as a construction tool in areas with access issues. In 2022 a Sikorsky S-70M was purchased which is being outfitted for firefighting with a 1,000-gallon tank. Due to certification requirements of the Federal Aviation Administration (FAA), it is estimated that this helicopter will not be in service until the end of 2023.

SDG&E has agreements with the County of San Diego, CAL FIRE, and the Orange County Fire Authority for aerial firefighting within the service territory. Dispatch of aviation firefighting assets is performed through CAL FIRE and these assets support the initial attack strategy to contain wildfires to less than 10 acres. SDG&E employs flight operations staff to assist in dispatching aerial assets 365 days per year, throughout the service territory. This allows the assets to be launched rapidly once dispatched by CAL FIRE.

2. Initiative Impact

This initiative is not directly tied to reducing a specific risk driver and reducing ignitions. Instead, the aviation assets owned by SDG&E and dispatched by CAL FIRE can provide year-

round availability for initial attack of ignitions that do occur, reducing the rate of spread and impact of these ignitions.

VIII. DATA GOVERNANCE

Data Governance: 2019-2022 totals ($000)						
Initiative	**Actual Capital**	**Actual O&M**	**Authorized Capital**	**Authorized O&M**	**Differential Capital**	**Differential O&M**
Centralized Repository for Data	$35,742	-	-	-	$35,742	-
Documentation and Disclosure of Wildfire-Related Data and Algorithms	$8,714	$1,321	-	$2,013	$8,714	$(692)
Total	**$44,456**	**$1,321**	**-**	**$2,013**	**$44,456**	**$(692)**

Management of programs and initiatives for mitigation of utility-related wildfires is a data-driven process. It requires data from a variety of static and real-time source systems to support operational needs, trend analysis, and predictive modeling. To ensure the data has high quality and integrity, the data must be governed through a set of standards and practices that uses people, process, and technology. Such practices will result in company data that is complete, accurate, consistent, accessible, compliant, and safeguarded appropriately.

Initially, SDG&E almost exclusively collected data metrics and measures manually. To enhance data quality and improve the efficiency of the data gathering process, SDG&E began developing a WMP Data Governance Framework (DGF) and an automated Central Data Repository (CDR) for wildfire-related data, which can be used by multiple internal and external stakeholders in the future. These changes will improve data collection by moving away from manual collection to a more uniform, electronic format that will provide data metrics in a searchable format, similar to a GIS data structure. Creating the CDR to be scalable and sustainable will accommodate future regulatory requirements and enhance SDG&E's ability to utilize data to evaluate the effectiveness of utility-related wildfire mitigation programs.

The DGF will define a set of repeatable standards, policies, processes, and controls for wildfire-related data. The vision of SDG&E's DGF is to make its wildfire-related data actionable, accessible, aligned, and auditable.

A. Centralized Repository for Data

Year	Units (n/a)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	n/a	$19	-	-	-	$19	-
2020	n/a	$6,895	-	-	-	$6,895	-
2021	n/a	$13,827	-	-	-	$13,827	-
2022	n/a	$15,000	-	-	-	$15,000	-
Total	**n/a**	**$35,742**	**-**	**-**	**-**	**$35,742**	**-**

1. Initiative Description

The WMP Centralized Repository for Data is consolidating data from over 10 different sources into a central repository, with a focus on automating data processes for the spatial and non-spatial components of the WMP Quarterly Data Report as well as to advance SDG&E's Asset Management capabilities as they relate to electric assets. There is also work in support of WMP Data Governance for data auditability and the data catalog.

The Centralized Repository for Data focuses on automating aggregated metrics required for the WMP non-spatial data tables. Raw data is gathered and centralized from multiple sources. The project works in close collaboration with WMP Data Governance for data auditability and initial WMP data catalog development advancing the maturity of data governance processes.

The WMP Advanced Analytics initiative continues to mature analytic capabilities to enable and develop predictive use cases and support ongoing wildfire mitigation and risk management objectives using a modern platform with machine learning services. This project includes the development of a data lake and machine learning pipeline to leverage cloud-based machine learning capabilities. These additional tools will allow SDG&E to develop analytics that identify where to reduce wildfire-related risk. A core set of reusable, cloud-based data science workspaces will enable faster model creation and feedback loops that evaluate and validate the

model. The use and validation of centralized datasets will also improve data quality for the inputs and outputs of newly developed models or tools.

SDG&E has improved its Asset Management capabilities with the WMP Asset Investment Prioritization (AIP) project which has been in progress since early 2020 and has worked to implement an internal Investment tool to support capital budget portfolio reviews and project selection.

2. Initiative Impact

This initiative is not directly tied to reducing a specific risk driver and reducing ignitions. Instead, the Centralized Repository for Data supports accurate data collection and reporting. This reporting is both mandated by Energy Safety and provides for better understanding of SDG&E's risks to inform investment prioritization.

B. Documentation and Disclosure of Wildfire-Related Data and Algorithms

Year	Units (n/a)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	n/a	-	-	-	$485	-	$(485)
2020	n/a	$2,209	-	-	$498	$2,209	$(498)
2021	n/a	$2,825	$16	-	$510	$2,825	$(495)
2022	n/a	$3,680	$1,305	-	$520	$3,680	$785
Total	**n/a**	**$8,714**	**$1,321**	**-**	**$2,013**	**$8,714**	**$(692)**

1. Initiative Description

Energy Safety requires submission of a Quarterly Data Report (QDR) utilizing a defined data taxonomy and schema for many feature classes to use for future WMP data analysis. This

project provides an automated solution to gather the required data, convert the data to geospatial format, and create the QDR for submission to Energy Safety, reducing human-related errors associated with data entry and reporting. The solution supports the Wildfire Mitigation Plan Data Governance initiatives, and the regulatory requirement for timely, accurate Quarterly Data Reports.

2. Initiative Impact

This initiative is not directly tied to reducing a specific risk driver and reducing ignitions. Instead, the Documentation and Disclosure of Wildfire-Related Data and Algorithms supports accurate data collection and reporting. This reporting is both mandated by Energy Safety and provides for better understanding of SDG&E's risks to inform investment prioritization.

IX. RESOURCE ALLOCATION AND METHODOLOGY

SDG&E's enterprise risk management process includes a step focused on risk-informed investment decision-making. The annual capital planning process prioritizes funding based on risk informed priorities and input from operations. Capital allocation planning sessions begin with input from each business unit manager as supported by their SMEs who perform high-level assessments of their capital allocation requirements based on achieving the highest risk mitigation at the lowest attainable costs. These requirements are presented to a cross-functional director team, which makes up the capital core planning team. This capital core planning team reviews the resource requirement submissions from all functional areas and projects are evaluated against priority by assessing a variety of metrics including safety, cost effectiveness, reliability, security, environmental, strategic, and customer experience. Recommendations for capital spending are then presented to a cross-divisional executive officers committee for approval. Once the capital allocations are approved, each individual operating organization is chartered to manage their

respective capital needs within the capital allotted by the plan. This includes re-prioritizations as necessary to address imminent safety concerns as they arise.

A. Allocation Methodology Development and Application

Year	Units (n/a)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	n/a	-	$233	-	$1,261	-	$(1,028)
2020	n/a	-	$3,719	-	$1,294	-	$2,425
2021	n/a	-	$5,279	-	$1,326	-	$3,953
2022	n/a	-	$3,966	-	$1,353	-	$2,613
Total	**n/a**	-	**$13,198**	-	**$5,234**	-	**$7,964**

1. Initiative Description

Initiatives included in this category cover both an enterprise-wide initiative (Investment Prioritization) led by the Asset Management organization as well as a more focused initiative (WiNGS) led by the wildfire mitigation team to apply more granular analytics to grid hardening projects.

Investment Prioritization

SDG&E's Asset Management organization, under the Investment Prioritization workstream, worked on building the governance process, resource allocation methodology, and enabling tools to support the creation of long-term and short-term plans for capital investment, operation & maintenance, and asset retirement.

The strategic goal of Investment Prioritization is to incorporate an enterprise-wide, MAVF methodology to demonstrate appraisal of capital investments in a consistent, transparent, repeatable and standardized manner through a data-driven, quantitative risk- and safety-based lens with the appropriate review and approval committees. MAVF will utilize SDG&E's strategic values and determine standardized value-based metrics to quantitatively compare projects and thereby enhance the ability to cross-prioritize across portfolios and optimize investment decisions, including wildfire mitigation investments, while ensuring effective spend of ratepayer funds. A software solution from Copperleaf, called C55, is being implemented to improve investment

prioritization capabilities. The purpose of the C55 implementation project is to develop business processes and a system for capital investment optimization using an objective, risk-informed value framework. The initial development of this value framework will be applied to electric transmission, substation and system protection assets and employ a phased approach applied to distribution and other assets supporting the electric system infrastructure.

WiNGS-Planning and WiNGS-Ops

While the Investment Prioritization Initiative described above focuses on enterprise-wide resource allocation, there was a need to develop a more granular application of the same type of modeling to tackle specific wildfire-related issues such as targeted grid hardening to reduce PSPS. To do that, the wildfire mitigation team developed the WiNGS-Planning model to quantify the impacts of wildfire and PSPS and identify more optimal solutions to target both wildfire risk reduction and PSPS reduction. The WiNGS-Planning model was developed internally with the support of third-party consultants to validate the methodology and provide external proxies to improve data used in the model. The current scope of WiNGS-Planning covers preliminary prioritization concepts for grid hardening. A more operational focused model, WiNGS-Ops, was developed as a supporting tool for real-time PSPS decision-making.

Finally, a centralized wildfire mitigation team was created with the responsibility of developing, executing, and overseeing SDG&E's wildfire mitigation plan across the organization. This team reviews and tracks all current wildfire mitigation operational targets on a weekly basis, and reviews proposals for new pilot programs or wildfire mitigation technologies. This team also leverages data across the Company to measure and report the effectiveness of mitigations, which feeds into SDG&E's risk models that are critical for prioritization and resource allocation. This team also continues to review feedback from external stakeholders including Energy Safety, the

Independent Evaluator, and intervenors so that SDG&E's WMP, WMP Quarterly Reports, Wildfire Safety Culture Assessment, and other deliverables meet or exceed expectations.

2. Initiative Impact

This initiative is not directly tied to reducing a specific risk driver and reducing ignitions. Instead, it supports various initiatives by providing better information to make risk-informed mitigation decisions.

X. EMERGENCY PLANNING AND PREPAREDNESS

Emergency Planning and Preparedness: 2019-2022 totals ($000)						
Initiative	**Actual Capital**	**Actual O&M**	**Authorized Capital**	**Authorized O&M**	**Differential Capital**	**Differential O&M**
Emergency Management Operations	-	$42,203	$5,237	$7,732	$(5,237)	$34,472
Community Outreach, Public Awareness, and Communications Efforts	$7,686	-	-	-	$7,686	-
Total	**$7,686**	**$42,203**	**$5,237**	**$7,732**	**$2,449**	**$34,472**

SDG&E engages in proactive planning and preparedness efforts to respond effectively to all hazards the Company may encounter. These efforts are informed by SDG&E's Risk Registry and consider risks caused or increased by climate change. The Company Emergency and Disaster Preparedness Plan (CEADPP) was developed as a guide to govern emergency response efforts, including Wildfire and PSPS emergency preparedness. This plan supports and is part of the overall emergency response plan framework.

The Wildfire Safety/PSPS Community Awareness campaign educates customers and the general public about the risk of wildfires and PSPS events and provides encouragement to take preparedness measures such as updating their profile contact information and signing up for notifications. During PSPS events, notifications, media updates, in-community signage, and situational awareness postings are used across social media and social media kits are shared with

community partners to reach a broad audience. Additionally, affected customers and the public are provided with the latest real-time updates and notifications during a PSPS event. Key communications are available in 22 prevalent languages.

Prior to the conclusion of a PSPS event, a patrol and restoration plan is created which identifies the expected times when various sections of the electric system are forecasted to be safe to perform a visual patrol to identify any damage and if no damage is present, restore power. The plan allows for timely resourcing to minimize time needed to safely restore customers and also optimizes any constrained resources to ensure they are deployed in a way that optimizes service restorations.

SDG&E provides assistance and resource access to those who are directly impacted by wildfires and/or PSPS events. Customers eligible for wildfire residential and non-residential customer protections are those identified as directly impacted by wildfires or who have self-reported as being impacted. Directly affected customers include those without electric service or those needing to re-locate (either temporarily or permanently) due to wildfire damage.

A. Emergency Management Operations

Year	Units (n/a)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	n/a	-	$4,672	$3,175	$1,863	$(3,175)	$2,809
2020	n/a	-	$12,219	$670	$1,912	$(670)	$10,307
2021	n/a	-	$12,919	$688	$1,959	$(688)	$10,960
2022	n/a	-	$12,393	$703	$1,998	$(703)	$10,395
Total	**n/a**	**-**	**$42,203**	**$5,237**	**$7,732**	**$(5,237)**	**$34,472**

1. Initiative Description

The Emergency Planning & Preparedness initiative supports SDG&E's company-wide efforts associated with emergency planning, preparedness, response, and recovery for all hazards and risks, with a strong focus on wildfire-related events. The programs and processes within this initiative include planning, training, exercising, and supporting responses and recovery efforts related to incidents, emergencies, disasters, and catastrophes.

The Emergency Planning & Preparedness initiative consists of five divisions: (1) Emergency Services Division, (2) Operational Field and Emergency Readiness, (3) Aviation Services, (4) Training and Exercise, and (5) Emergency Management Technology Solutions.

Emergency Service Division

The Emergency Services Division (Emergency Services) facilitates SDG&E's emergency planning, preparedness, response, and recovery through the Emergency Operations Center (EOC) for incidents regardless of cause, size, or complexity. The EOC plays a substantial role in driving forward SDG&E's longstanding commitment to safety, reliability, and security risk mitigation. Cross-functional subject matter experts virtually or physically assemble in the EOC to assess and provide situational awareness to internal and external stakeholders, establish overarching incident objectives, planning, anticipation, response, communications, and coordination. Operating within a utility-compatible Incident Command System (ICS) framework, the EOC coordinates emergency response and preparedness activities.

Continuing SDG&E's essential functions is of vital importance to the community during emergency events. Emergency Services facilitates 59 companywide business continuity plans that coordinate activities during catastrophic events so that SDG&E can continue to provide clean, reliable, and safe energy to its customers.

As an essential part of SDG&E's contingency planning and restoration process, Emergency Services also manages the Mutual Assistance program. Under Mutual Assistance, utilities impacted by a significant event can increase the size of their workforce by borrowing restoration workers from SDG&E. If necessary, SDG&E may also draw on Mutual Assistance from partners to promote community resilience, emergency response, and recovery.

Operational Field and Emergency Readiness

Maintaining safe and reliable utility service during an emergency, such as wildfire or earthquake, requires multi-disciplinary efforts among numerous stakeholders. When time is of the essence, coordination is key. SDG&E's Operational Field and Emergency Readiness (OFER) personnel are experienced public safety and emergency response professionals skilled in ICS implementation who work directly with SDG&E's field-level partners to develop flexible, scalable, sustainable, and measurable scene management processes. OFER facilitates three primary programs: the After Action Review (AAR) program, First Responder Outreach Programs (FROP), and the field mentoring program.

The AAR program is an essential aspect of SDG&E's emergency operations effort aimed at facilitating solutions and conversations between stakeholders to effectively identify risks post-incident and develop and share best practices for future improvements. SDG&E analyzes incidents and EOC activations to identify opportunities for improved safety, scene management, communications, or training. The AAR program communicates lessons learned with internal stakeholders.

Those lessons learned and critical incident findings are also communicated to first responders through FROP to external San Diego Country public safety partners. The FROP program is also instrumental in bridging relationships between SDG&E field personnel and first responder partners. FROP staff foster and maintain strong relationships by delivering dozens of annual natural gas safety awareness training and other outreach services to hundreds of first responders within SDG&E's service territory. SDG&E's staff of retired fire chiefs leverage their extensive industry knowledge and relationships to share information with first responders regarding natural gas safety and foundational operational information on SDG&E's facilities.

OFER's third program weaves together elements from the AAR program and FROP. The field mentoring program designs and delivers emergency response and readiness training with mentorship to SDG&E's operational field employees. When requested, field mentors deploy to local field-level incidents and mutual assistance assignments from other utilities. They also fill critical roles within the ICS structure, such as Safety Officer or Agency Representative, during incidents and share Incident Command expertise.

Aviation Services

The Aviation Services Division coordinates safe and effective aviation services 365 days per year to internal and external customers in SDG&E's service territory. Aviation Services manages SDG&E's aviation assets, including exclusive-use helicopters, SDG&E-owned helicopters, and Unmanned Aerial Systems (UAS). Exclusive-use and SDG&E's owned helicopters increase the overall level of situational awareness through a combination of innovative business practices and highly specialized mission equipment. For instance, helicopter-mounted cameras enable live streaming of ongoing situations to select public safety entities. During emergency operations, highly trained personnel coordinate with the appropriate controlling agencies to provide supplemental fire suppression capabilities to SDG&E's service territory.

Helicopter and drone inspections also allow SDG&E an additional tool to address compliance with federal and state requirements and identify issues that may need repair. The UAS operators perform safe, cost-effective, and time-saving visual inspection of the service territory and infrastructure to reduce infrastructure damage. The issues identified during these inspections may go unobserved during a visual ground inspection; these supplemental and complementary reviews allow a different perspective on assets to identify areas that may pose a risk.

To further enhance service reliability, Aviation Services has expanded its services to construction support. For example, helicopters are used to set poles for grid hardening efforts, to

transport linemen and other personnel to areas with difficult access, and pull wire when installing new lines in areas with no road access. Helicopters may also be utilized to patrol PSPS areas prior to and post RFW or PSPS events. This important activity helps to provide access to otherwise difficult to access areas, speed up the patrols, and promote safer operations. These patrols are critical to reduce the potential for wildfires and enable faster restoration during PSPS events.

Training and Exercise

Training and Exercises are a vital component of SDG&E's emergency preparedness as they provide each emergency preparedness and response division an opportunity to validate plans, teach processes, build and sustain capabilities, and address areas for improvement. The Training and Exercise Division (T&E Div.) develops and implements strategies and curricula to implement SDG&E's ICS-focused approach, designed to strengthen enterprise-wide emergency response and recovery practices. To establish a cohesive response across all risk factors, experienced staff develop training to enhance EOC responders' knowledge, skills, and abilities. Exercises utilize a progressive approach to assess plans, procedures, and capabilities and are delivered through innovative, virtual tools to maximize engagement.

Emergency Management Technology Solutions

The Emergency Management Technology Solutions Division (EMTS Div.) delivers state-of-the-art tools, applications, and expertise to maintain technical functionality in the EOC. The EMTS Div. partners closely with all the other emergency preparedness and response divisions to build tools and resources to streamline, collect, and combine data in support of operations. This collaboration builds enhanced and resilient data sources and dashboards for daily and emergency recovery efforts. The Incident Management System software tool, managed by EMTS, creates a companywide Common Operating Picture (COP) to provide near real-time information to decision-makers for public and employee safety. In collaboration with IT and Cybersecurity,

EMTS Div. works to build hardware standards to support all forms of EOC activations. This includes the current hardware used during remote activations of the EOC and the support and distribution of alternative communications solutions such as satellite phones. The goal and intent are to provide reliable hardware (*e.g.*, computers) to support EOC activations.

2. Initiative Impact

This initiative is not directly tied to reducing a specific risk driver and reducing ignitions. Instead, the emergency preparedness plans and personnel allow for SDG&E and its customers to be prepared for and respond to wildfires, PSPS, and other hazards.

B. Community Outreach, Public Awareness, and Communications Efforts

Year	Units (n/a)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	n/a	$64	-	-	-	$64	-
2020	n/a	$1,881	-	-	-	$1,881	-
2021	n/a	$2,971	-	-	-	$2,971	-
2022	n/a	$2,771	-	-	-	$2,771	-
Total	**n/a**	**$7,686**	**-**	**-**	**-**	**$7,686**	**-**

1. Initiative Description

SDG&E customers and the general public are affected by wildfires, which are now a nearly year-long presence in California. Customers and the general public who are not educated about wildfire safety, emergency preparedness, and resiliency may be ill-prepared for a wildfire or a PSPS event.

To mitigate this risk, SDG&E's comprehensive wildfire safety public education and outreach plan was developed with the intent of increasing community resiliency to wildfires and mitigating the impact of PSPS events. The plan is divided into 3 phases: prior to, during, and following a wildfire or PSPS event. Communication efforts before a wildfire focus on educating customers and the public about the measures and programs being implemented to reduce the threat of catastrophic wildfires, tactics they can employ to remain resilient and safe, and the community resources available. During a wildfire-related event, real-time awareness and updates about the event are provided along with information on how to remain safe and vigilant and the community

resources available through the end of the event. After a wildfire, SDG&E examines communications and solicits customer and stakeholder feedback with the intent of refining and improving communication efforts.

2. Initiative Impact

This initiative is not directly tied to reducing a specific risk driver and reducing ignitions. Instead, these communication efforts allow for SDG&E and its customers to have all the necessary information to maintain safety during wildfires, PSPS, or other emergency events.

XI. STAKEHOLDER COOPERATION AND COMMUNITY ENGAGEMENT

Stakeholder Cooperation and Community Engagement: 2019-2022 totals ($000)						
Initiative	**Actual Capital**	**Actual O&M**	**Authorized Capital**	**Authorized O&M**	**Differential Capital**	**Differential O&M**
Community Engagement	-	$1,614	-	-	-	$1,614
PSPS Communication Practices	$15,809	$32,151	-	$1,096	$15,809	$31,055
Total	**$15,809**	**$33,765**	**-**	**$1,096**	**$15,809**	**$32,669**

SDG&E remains dedicated to partnering with utility customers, elected officials, AFN partners, tribal nations, nonprofit support organizations, first responders, and all other public safety and community partners, understanding they all play a unique and significant role in achieving wildfire prevention and mitigation in the service territory. SDG&E takes its role within the communities it serves seriously. This is especially true during times of PSPS, when communities depend on complete, accurate, and timely information for their safety.

SDG&E strives to provide all stakeholders upfront awareness and information, educate the public on wildfire preparedness, and equip those it serves with information and resources to navigate the adversity of an emergency, wildfire, or PSPS event. Through research, planning and strategic partnerships, SDG&E has implemented a robust public education and outreach strategy, which is continuously analyzed to identify areas of improvement. Relationships with Community Based Organizations (CBOs) and stakeholders are also utilized to amplify and disseminate critical, sometimes life-saving information.

A. Community Engagement

Year	Units (n/a)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	n/a	-	$64	-	-	-	$64
2020	n/a	-	$534	-	-	-	$534
2021	n/a	-	$617	-	-	-	$617
2022	n/a	-	$400	-	-	-	$400
Total	**n/a**	**-**	**$1,614**	**-**	**-**	**-**	**$1,614**

1. Initiative Description

Customers and the general public may not have knowledge of wildfire safety, resiliency, and emergency preparedness. In addition, they do not have a way to access information before an emergency, wildfire, or PSPS event occurs. Without this information, customers cannot take the necessary steps to prepare for and navigate the inherent difficulties these events may bring.

To mitigate this risk, a comprehensive wildfire safety communications and outreach plan was developed with the intent of increasing proactive emergency preparedness efforts and community resiliency to wildfires. In addition to webinars, Wildfire Safety Fairs, and the comprehensive year-round campaign described in the Emergency Planning and Preparedness category, outreach advisors work with community organizations to provide education, programs, and services that focus on wildfire preparedness, PSPS notifications, and support services.

A key channel and support network utilized by outreach advisors is the Energy Solutions Partner Network. This network is comprised of nearly 200 CBOs who serve a critical role in connecting SDG&E with its constituencies. Through the Energy Solutions Partner Network, multicultural, multilingual, senior, special needs, disadvantaged, and AFN communities can be reached. In many cases, CBOs are trusted partners and experts by the communities they serve, providing valuable feedback on the needs of their constituents.

SDG&E works with CBOs year-round to help prepare customers for wildfires through presentations, meetings, and amplification of emergency preparedness information. Additionally, when a PSPS is possible, notifications and updates are provided to these organizations who then

amplify wildfire preparedness and notification messaging to hard-to-reach customers who may not utilize traditional channels.

The Wildfire Safety Community Advisory Council (WSCAC) is a forum allowing well-connected and trusted community leaders to provide feedback recommendations and support to SDG&E senior management and the Safety Committee of SDG&E's Board of Directors. This specialized group of diverse and independent leaders from public safety, tribal government, business, nonprofit, and academic organizations in the San Diego region possess extensive experience in public safety, wildfire management, community-based services, and applied technology, providing valuable insight to SDG&E's continuous improvement efforts.

WSCAC meetings are hosted quarterly, led by SDG&E's Chief Executive Officer, and are attended by members of the Safety Committee of the SDG&E Board and representatives from other key areas of the company. At WSCAC meetings, the WMP and subsequent updates are presented for discussion, suggestions, and recommendations. WSCAC members also provide input on relevant emerging community issues on wildfire safety and preparedness.

2. Initiative Impact

This initiative is not directly tied to reducing a specific risk driver and reducing ignitions. Instead, these communication efforts allow for SDG&E and its customers to have all the necessary information to maintain safety during wildfires, PSPS, or other emergency events.

B. PSPS Communication Practices

Year	Units (n/a)	Actual Capital	Actual O&M	Authorized Capital	Authorized O&M	Differential Capital	Differential O&M
2019	n/a	$743	$4,260	-	$264	$743	$3,996
2020	n/a	$4,474	$8,230	-	$271	$4,474	$7,959
2021	n/a	$5,187	$10,180	-	$278	$5,187	$9,902
2022	n/a	$5,405	$9,481	-	$283	$5,405	$9,198
Total	**n/a**	**$15,809**	**$32,151**	**-**	**$1,096**	**$15,809**	**$31,055**

1. Initiative Description

SDG&E conducts PSPS-specific communications in three phases: prior to, during, and following a PSPS event. Efforts before a PSPS focus on educating customers and the public about what a PSPS is and tactics they can employ to remain safe, resilient, and updated during a PSPS occurrence. In 2020, SDG&E expanded its public education and outreach efforts associated with its PSPS Communications Plan. In light of COVID-19 considerations, special emphasis was placed on reaching and educating customers and the public in new and novel manners. For example, in September 2020, the Company launched its novel PSPS Mobile App (Alerts by SDG&E). This new tool enables customers to receive information including, but not limited to, notifications, Community Resource Center information with GPS directions, and other real-time updates and safety information related to PSPS activities. During a PSPS, the company focuses on providing real-time awareness and updates about the event and how to remain safe. For instance, SDG&E assigns a dedicated 2-1-1 organization liaison who is responsible for conveying real-time updates and talking points. The Company will also employ standard communication channels to promote 2-1-1 service resources including, but not limited to, social media channels, broadcast and print media, and the SDG&E NewsCenter and website. Lastly, following a PSPS, the Company examines communications and solicits customer feedback with the intent of refining and improving communication efforts for the following year. Specifically, SDG&E reaches out to customers, through formal surveys, to establish a baseline awareness of PSPS-related messaging and communications at the beginning of wildfire season. At the end of wildfire season, customers will again be surveyed to measure the effectiveness of public education efforts and communications.

SDG&E assigns a dedicated 2-1-1 organization liaison who is responsible for conveying real-time updates and talking points. SDG&E will be investing in improvements that enhance both the wildfire safety and PSPS communications. The public education campaign will start sooner in

the year and will work to expand the reach of communications within the service territory. Also, the formal CBO contract established in 2020 will continue, and the lessons learned during the 2020 wildfire season will be applied to future campaigns. The Company will also review and assess the prevalent languages identified. The expanded CBO collaboration will help with this effort. Additionally, the Company is considering and evaluating additional efforts including, but not limited to, working with local school districts to enhance public education efforts. Considerations include school newsletters, communications to parents as well as leveraging established school communication platforms (emails, text messages, and collateral materials). SDG&E is also examining new opportunities within its established partnerships with local Tribal Councils and other resources that serve Native American communities. Along with the expanded communication efforts, SDG&E is working to develop new communications in a culturally appropriate and relevant manner.

2. Initiative Impact

This initiative is not directly tied to reducing a specific risk driver and reducing ignitions. Instead, these communication efforts allow for SDG&E and its customers to have all the necessary information to maintain safety during PSPS events.

XII. CONCLUSION

SDG&E's incremental wildfire mitigation costs support programs that are risk informed, effective, and facilitate the implementation of SDG&E's approved WMPs. The Commission should authorize the activities described in my testimony because they are just and reasonable to promote public safety.

This concludes my revised prepared direct testimony.

XIII. WITNESS QUALIFICATIONS

My name is Jonathan T. Woldemariam. My business address is 8330 Century Park Court, San Diego, California, 92123. I am employed by SDG&E as the Director of Wildfire Mitigation. I am responsible for developing and overseeing the execution of the Company's Wildfire Mitigation Plan, which includes the vegetation management program. I work to optimize a portfolio of initiatives to help decrease wildfire risk.

I joined SDG&E in 1994 and have served as a director for Transmission and Substation Operations, Electric Transmission and Distribution Engineering, and Construction Services. I have over 28 years of experience in the electric utility industry. I am currently serving on the Board of Directors 2-1-1 San Diego, a local non-profit which is the region's trusted source for access to community, health, social, and disaster services.

I have a bachelor's degree in electrical engineering, with a major field of study in Electrical Power and am a licensed Professional Engineer in California.

I have previously testified before this Commission.