PACIFIC GAS AND ELECTRIC COMPANY'S APPROACH TO ADDRESSING CLIMATE RISKS

C2ES SOLUTIONS FORUM

Based in San Francisco, Pacific Gas and Electric Company (PG&E) provides natural gas and electric service to nearly 16 million people throughout Northern and Central California. PG&E's service area includes diverse communities from the coast to oil-producing regions around Bakersfield and rural agricultural communities across the Central Valley. As part of its broader climate change commitment, the company is working in a variety of ways to address the need to adapt to changing climate conditions.

As an energy provider, PG&E has identified a range of potential risks to its business, including wildfire risk, temperature changes, rainfall and runoff patterns, sea level rise, and storm frequency and intensity.

To address these risks, PG&E is taking a multi-faceted approach:

- Robust emergency response plans and procedures to address near-term risks, including more extreme storms, heat, and wildfires.
- A multi-year, comprehensive risk assessment process to prioritize infrastructure investments for longer-term risks.
- An in-house climate change science team that regularly reviews the most relevant science and integrates its research into PG&E's risk assessment process.
- Active engagement at the federal, state, and local level on climate change adaptation and resilience, including joining U.S. Department of Energy's (DOE) Partnership for Energy Sector Climate Resilience as a forum to share best practices on reducing vulnerabilities to climate impacts.

PG&E recently released its *Climate Change Vulnerability Assessment* report as part of its broader sustainability commitment and participation in the DOE Partnership. This report examines PG&E's vulnerability to various risks, shares the preliminary results of the company's Natural Hazard Asset Performance initiative and related efforts, and discusses key aspects of the company's ongoing efforts to address changing climate conditions.

The primary climate change risks that PG&E examined in its vulnerability assessment were flooding from storm events, sea level rise, land subsidence, heat waves, changes in precipitation patterns, and wildfire danger. Select climate change risks and their potential impacts identified in the report, along with example actions being taken to address these risks, are shown in Table 1.

PG&E's climate science team developed future climate scenarios based on various sources, including Federal Emergency Management Agency flood maps (100- and 500-year), California Coastal Commission sea level rise guidance, National Oceanic and Atmospheric Administration data on inundation and subsidence, and resources like the California Climate Assessment and Cal-Adapt. PG&E utilized mapping of scenarios to determine the number and percent of facilities, as well as specific facilities at risk to these different stressors, primarily focusing on the 2050 timeframe.

PG&E notes that this vulnerability assessment report is a first step. The next phases will be to complete the performance assessment of its assets by the end of 2016 to determine critical assets that are vulnerable or susceptible to failure under different scenarios, then to

TABLE 1: Example Climate Risks, Impacts, and Actions from PG&E's Vulnerability Assessment

RISK	POTENTIAL IMPACT	EXAMPLE NEAR-TERM ACTIONS TAKEN
Increased wildfire frequency and intensity	Threat from wildfire to customers as well as PG&E assets such as electric transmission and distribution lines, gas infrastructure and hydroelectric assets—also creating the need for emergency response from PG&E crews.	Testing, reinforcing, and replacing wooden distribution and transmission poles; vegetation management; utilizing infrared technology to identify weaknesses in wire connection equipment.
Change in temperature extremes	Risk that certain electrical assets may fail, become less efficient or less reliable, and may need to be modified or replaced as a result of higher temperatures, including warmer daytime maximums and nighttime minimums for prolonged periods.	Added new tools for load growth planning, installed SmartMeters, and increased emergency stock levels of equipment.
Change in mean (average) temperatures	Higher annual electricity demand if average temperatures increase at the rate global climate models currently predict.	Improved reliability and increased capacity to the distribution grid through new feeders and substation transformers.
Change in precipitation patterns and drought	Increased risk to infrastructure from land subsidence that occurs as a result of increased groundwater extraction during extreme drought conditions.	Conducting studies on land subsidence, conserving water in operations, and helping customers to reduce water use.
Sea level rise	Risk of damage to substations and other gas and electric infrastructure.	Providing input to sea level rise models and studies.

Source: PG&E Climate Change Vulnerability Assessment

integrate this work into the risk management process.

PG&E actively engages with stakeholders at the federal, state and local level to assess climate risks and develop resilience strategies. In 2015, PG&E participated in a workshop with the California Public Utilities Commission and California Energy Commission to discuss the state's energy sector vulnerabilities and what steps utilities are taking to address risks. The company also regularly works with regional partners and local governments to conduct studies, identify vulnerabilities and develop initiatives to enhance resilience in their service area.

Link to PG&E's vulnerability assessment: http://www.pgecurrents.com/wp-content/uploads/2016/02/PGE_climate_resilience.pdf.