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California Energy Commission

Potential Improvements at Natural Gas Plants to Support Electric System Reliability and Resiliency

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2020 Extreme Heat Events

- California and the Western U.S. experience unprecedented heat storms in both August and September
- Multiple active wildfires rage across California and the Western U.S.
- Energy demand exceeds supply AND planning targets
- Heat and wildfires significantly impact energy generation and transmission
- High temperatures and dispatch stress multiple sub-systems of natural gas power plants
 - ✓ Results in power loss in combustion turbines, steam tube leaks, condenser pump failures
 - ✓ Plant derates due to inlet air and cooling system stresses
- Smoke from wildfires also decreases solar output



August 2020 Extreme Heat Event

- **August 14:** CAISO issues Stage 3 Emergency Notice indicating lack of insufficient operating reserves/ initiates rotating outages to maintain grid stability
 - ✓ Investor-owned utilities (PG&E, SCE, and SDG&E) in CAISO-controlled grid experience first rotating outages in 20 years
 - ✓ 491,600 residences and businesses lost power from 15 to 150 minutes
- **August 15:** 321,000 residences and businesses lost power from 8 to 90 minutes
- **August 16:** Governor Newsom issues Emergency Proclamation and Executive Order N-74-20 to free up additional capacity / allow use of back-up energy sources
- **August 17-18:** Conservation and support from Generators and other Balancing Authorities helps avoid additional outages



September 2020 Heat Storm

- **September 2:** Governor Newsom issues Emergency Proclamation temporarily suspending state and local permitting requirements for electric generators, effective September 3-8
- **September 3:** CAISO issues a statewide flex alert for September 5-7 for voluntary load reductions each day from 3-9 p.m.
 - ✓ Warns that consumers should “be prepared for potential power outages, both planned and unplanned during heat waves, especially in extremely high temperatures that last multiple days” and
 - ✓ “hot weather can also impact generation and transmission equipment, as it runs harder and longer with less time to cool, which can cause machinery failure.”
- **September 5:** CAISO system loses approximately 1,600 of MW of generation as a result of wildfires forcing transmission out of service



September 2020 Heat Storm

- **September 5:** Some generators inform CAISO they can't produce maximum generation capability without exceeding federal air quality or other permit limitations.
- **September 6:** CAISO seeks an immediate emergency order from DOE to authorize additional energy from generators, arguing that loss of power in the presents a greater risk to public health and safety than limited departures from permit limits.
- **September 6:** DOE issues Order No. 202-20-2 to "to preserve the reliability of bulk electric power system."
- **September 7:** PG&E implements Public Safety Power Shutoffs in 22 counties due to extreme weather and wildfire potential, affecting 172,000 customers.



Root Cause of 2020 Heat Events

- Preliminary Root Cause Analysis

<http://www.cao.com/Documents/Preliminary-Root-Cause-Analysis-Rotating-Outages-August-2020.pdf>

- Assembly Committee on Utilities and Energy Hearing October 12, 2020

<https://autl.assembly.ca.gov/content/2020-oversight-informational-hearings>

- High level findings and next steps

- ✓ Near-term – by Summer 2021

- ✓ Mid-Term (2022 through 2025) and Long-Term

- ✓ Final Report expected by the end of 2020



STEP Workshop

- STEP Workshop November 19, 2020
- The existing natural gas fleet can help meet near-term system reliability and resiliency as we move towards SB100 goals
- Plant improvements implemented by the summer of 2021 can help mitigate future stresses on California's electric system like those caused by extreme heat events in 2020.
- Near-term physical improvements can increase plant output, efficiency, turndown, and flexibility – all of which can provide insurance against extreme weather, fire, or climate-related events and help smooth the transition to SB100 goals.
- From an environmental/air quality perspective, additional peak electricity provided by natural gas power plants using state-of-the-art emission controls is preferable to load shedding, which can result in port-based marine vessels using onboard electricity generated from petroleum fuels or back-up power provided by the emergency operation of diesel-fueled back-up generators at data centers



Thank You!

