Summer 2020 SoCalGas Conditions and Operations Report

BY STAFF OF THE CALIFORNIA PUBLIC UTILITIES COMMISSION

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Executive Summary

This report presents a summary and analyses of natural gas operations in Southern California from April 1 to October 31, 2020 (the summer), by the California Public Utilities Commission's (CPUC) Energy Division staff (Staff). This is the second of a series of retrospective reports that focuses on summer conditions and operations in the Southern California Gas Company (SoCalGas) territory.

The purpose of the report is to provide a summary of weather patterns, operational decisions, and price trends within the natural gas and electric markets. It also provides an analysis of the impacts of regulatory changes made by the CPUC to address energy reliability challenges and price volatility in the last few years. This report is meant to provide decisionmakers and stakeholders with information to plan for continued energy reliability and customer affordability.

In summer 2020, Southern Californians experienced gas and electric price volatility due to a combination of several heat waves, high electric demand, and insufficient power supply. SoCalGas' gas system was in a better position to respond to the escalation in electric generation demand during the heatwaves than it was in previous years because of two notable factors: 1) there were no critical gas transmission lines out of service; and 2) the revised Aliso Canyon Withdrawal Protocol enabled SoCalGas to initiate withdrawals from the field during peak hours. In comparison, during the summer 2018 heatwaves, Line 235-2—a critical transmission line in SoCalGas' Northern Zone—was out for repairs. In addition, Aliso Canyon was considered an "asset of last resort" under the Withdrawal Protocol in place at that time. This combination of factors led to severe gas supply constraints during the heatwaves, which resulted in electric customers having to pay about $916 million in excess costs in 2018.[1]

SoCalGas' storage inventory levels at the start of summer 2020 were fairly robust. New balancing rules went into effect on May 1, 2020, pursuant to the Triennial Cost Allocation Proceeding decision, (D.) 20-02-045.[2] Under the new rules, the injection capacity allocated to core customers and the balancing function is prorated daily based on available capacity. The revised rules helped customers build and maintain storage inventory even after Aliso Canyon became full. In addition, a mostly mild summer created the potential for customers to inject gas into the storage fields. However, injection opportunity on the system became more limited during the mid-August heatwave when SoCalGas frequently had its four storage fields on withdrawal to meet the surge in hourly electric generation demand over multiple days. SoCalGas withdrew approximately 3.5 billion cubic feet (Bcf) of gas from storage during the mid-August heatwave and approximately 70 percent of the withdrawals came from Aliso Canyon. Despite these withdrawals, total storage capacity was nearly full by September 30, 2020.

To keep the gas system in balance, SoCalGas calls High Operational Flow Orders (OFOs) when customers have scheduled too much gas on the system and Low OFOs when they haven't scheduled enough. When OFOs are called, they are numbered in stages based on severity.[3] In summer 2020, SoCalGas called 22 Stage 3 and two Stage 3.1 High OFOs. Staff review of customer behavior during

[1] Aliso Canyon I.17-02-002 Phase 2: Results of Econometric Modeling, pp. 36, 40-41: 349793504.PDF (ca.gov).
[2] The most recent TCAP decision, D.20-02-045, was approved on February 28, 2020: http://docs.cpuc.ca.gov/SearchRes.aspx?DocFormat=ALL&DocID=328289863
[3] The Glossary in Appendix 1 describes the different stages of OFOs and corresponding noncompliance charges.

the Stage 3 and Stage 3.1 High OFO events showed that customers reduced their scheduled quantities when a Stage 3 high OFO was called, mostly in response to the tolerance band set by SoCalGas. In other words, when SoCalGas set a tolerance band of 15 percent during the spring injection season, customers were less likely to reduce their scheduled quantities by noticeable amounts. However, when SoCalGas tightened the tolerance band towards the end of October when there was very little injection capacity left on the system, the reduction in customers' scheduled quantities was more noticeable.

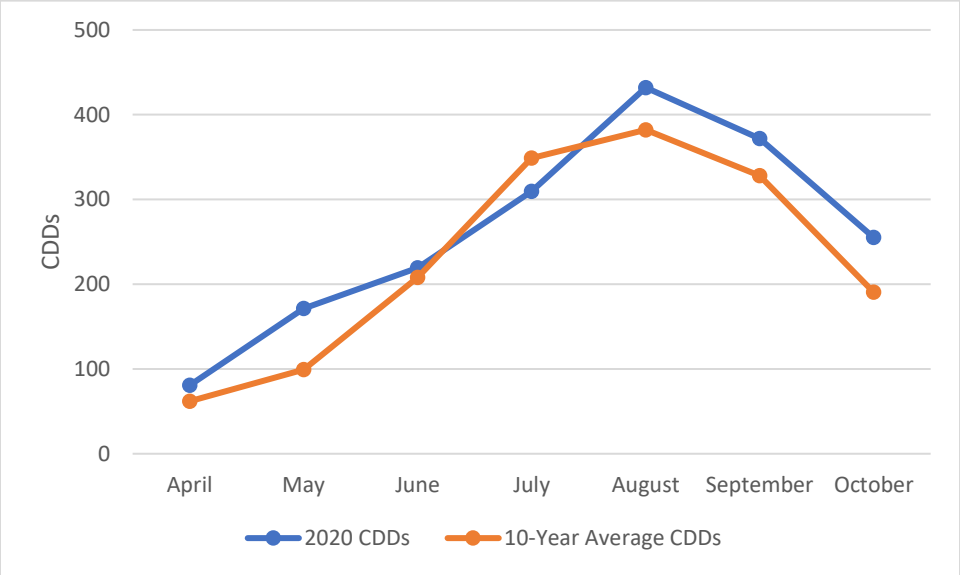
Aliso Canyon withdrawals totaling about 4.8 Bcf occurred on 18 gas days in summer 2020. All withdrawals occurred under Condition 1 of the Withdrawal Protocol, which is triggered if preliminary low OFO calculations indicate a Stage 2 Low OFO or higher. The inclusion of Aliso Canyon's Withdrawal Capacity into the low OFO calculation eliminated the issuance of a low OFO on 13 out of those 18 days. SoCalGas called 11 Stage 1 Low OFOs during the summer. However, there were no Stage 2 or higher Low OFOs.

Natural gas prices in Southern California were generally stable throughout the summer due to moderate weather, high storage inventories, and a decline in the futures market. In addition, there were no major transmission lines out of service as mentioned above. Gas prices became more volatile in mid-August as temperatures soared. SoCal Border prices hit an average of $9.14 per million British thermal units (MMBtu) on August 17, and SoCal Citygate reached an average of $13.26/MMBtu on August 18. Prices, however, were lower than compared to the price spikes seen during the July 2018 heatwaves when SoCal Citygate prices peaked at $39/MMBtu.

Weather

Temperatures in Southern California were generally mild during the first half of the summer. However, as shown in Figure 1 below, in April and May, there were 19 and 72 more Cooling Degree Days (CDDs), respectively, than the 10-year average. CDDs measure how hot the temperature was on a given day. One CDD is when the average temperature for the day is one degree above 65° Fahrenheit. The higher temperature, the more CDDs there will be for a given day. Higher CDDs typically mean more gas-fired electric generation activity is needed due to increased cooling loads. There were 219 CDDs in June, which mostly tracked the 10-year average. There were 310 CDDs in July, which was below the 10-year average by about 40 CDDs.

Figure 1: Comparison of Cooling Degree Days: 2020 and 10-Year Average



Data Source: SoCalGas Data Request Response

August saw record-breaking heatwaves across the western United States, including Southern California, which resulted in rotating power outages across several regions. It was the third-hottest August on record,[4] with 432 CDDs, which was 50 CDDs higher than the 10-year average. In response to the above-normal temperatures, the California Independent System Operator (CAISO) issued several Flex Alerts from August 13 through August 19 calling for statewide conservation efforts and restricted maintenance activities.[5]

In addition, the CAISO declared Stage 3 Emergencies on August 13 and 14 and ordered rotating blackouts for the first time since the 2001 energy crisis[6] as air conditioners pushed up electric demand. The Root-Cause Analysis Report issued by the CAISO, CPUC, and the California Energy Commission (CEC) in January 2021 concluded that the extreme August heat wave was a 1-in-35-year weather event in California.[7] The impact of this weather event on SoCalGas' gas system is discussed later in this report.

Storage Usage and Inventory

Summer 2020 began with a fair amount of storage inventory. As shown in Figure 2 below, Aliso Canyon was approximately 52 percent full at the beginning of the injection season while the combined non-Aliso fields were 68 percent full. This is a drastic difference from the inventory levels of 2019. While Aliso Canyon had more gas in storage at the same time in 2019, the combined non-

[4] NOAA News Article Dated September 9, 2020: https://www.noaa.gov/news/summer-2020-ranked-as-one-of-hottest-on-record-for-us

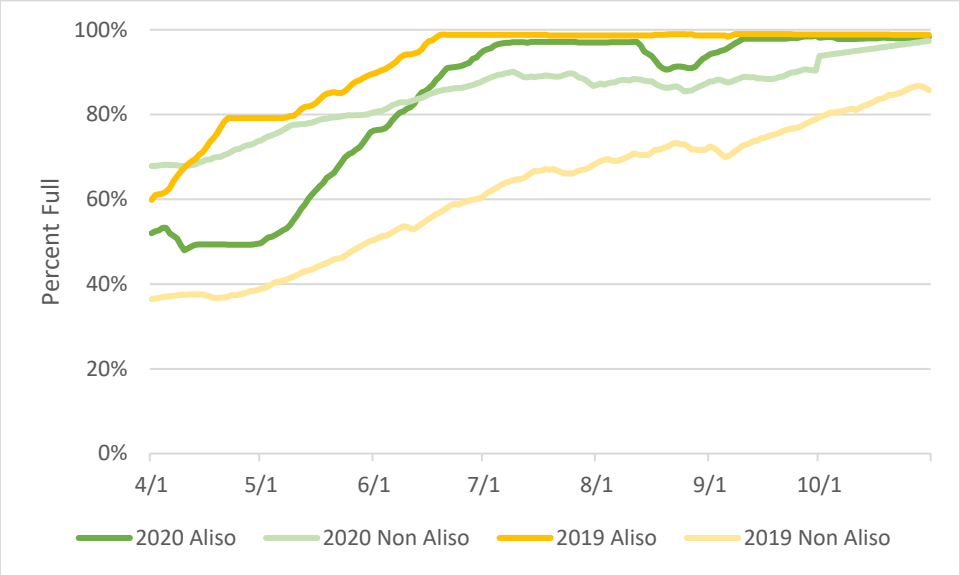
[5] CAISO Flex Alerts: https://www.flexalert.org/news

[6] CAISO Summary of Past Flex Alerts and Emergencies: http://www.caiso.com/Documents/FlexAlertNoticesIssuedFrom1998-Present.pdf

[7] Final Root Cause Analysis Report: http://www.caiso.com/Documents/Final-Root-Cause-Analysis-Mid-August-2020-Extreme-Heat-Wave.pdf

Aliso fields were only 36 percent full in 2019. The difference can be attributed to the combined impacts of a prolonged stretch of cold weather during winter 2019 and more reliance on the non-Aliso fields under the Aliso Canyon Withdrawal Protocol (Withdrawal Protocol) that was in place at the time. As shown in Figure 2 below, Honor Rancho, SoCalGas' second largest storage field, dropped to 30 percent of its maximum capacity by the start of summer 2019 because SoCalGas relied mostly on that field to meet customer demand while it was unable to access Aliso Canyon during the winter. Under the current Withdrawal Protocol, however, SoCalGas can use Aliso Canyon under certain conditions to help preserve the inventory levels of the non-Aliso fields. This policy change, combined with the milder weather, placed the non-Aliso fields in a better position at the start of summer 2020.

Figure 2: April-October 2019 and 2020 Storage Inventory Levels



Data Source: SoCalGas Envoy

SoCalGas began injecting gas into all available storage fields at the beginning of the spring injection season in April 2020 while also completing the low inventory shut-ins required by the California Geologic Energy Management Division (CalGEM). When a storage field is shut in, it is completely offline, meaning SoCalGas cannot inject or withdraw gas. SoCalGas shut in one field at a time and thus was able to inject gas into the three operational storage fields. In addition, there was ongoing maintenance throughout the summer related to recent CalGEM regulations that led to reductions in injection and withdrawal capacities compared to previous years.[8]

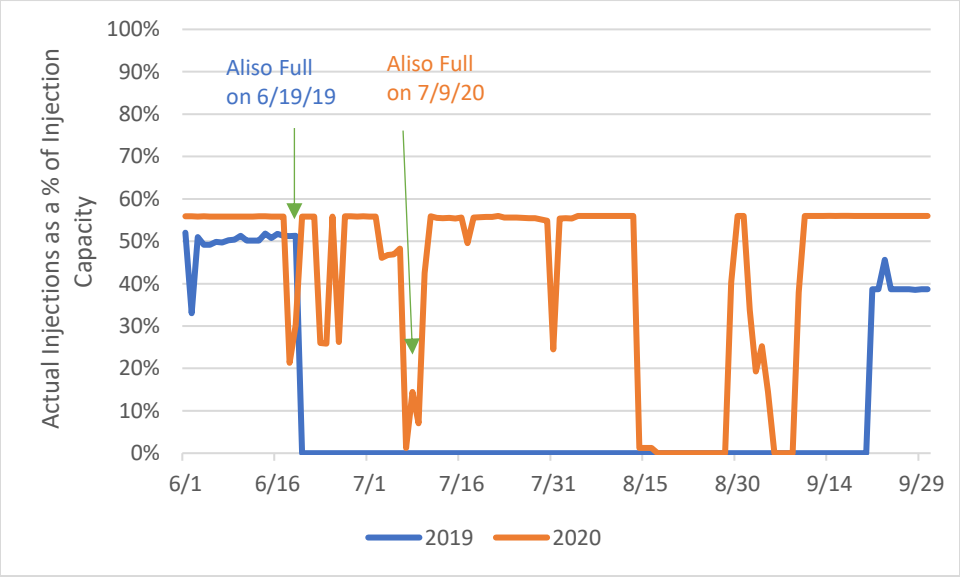
The difference in total storage inventories in 2019 and 2020 can be attributed to different injection patterns during the two years. In the summer of 2019, there were no significant weather events that drew down storage inventory. However, under the rules in place at that time, when injection

[8] In the aftermath of the October 2015 Aliso Canyon gas leak, CalGEM developed more stringent regulations for California's natural gas storage fields that went into effect October 1, 2018. These regulations require that all gas storage wells be converted to tubing-only flow within seven years and that storage providers conduct mechanical integrity and pressure testing on each well every 24 months unless a different testing schedule is proposed by the storage provider in its Risk Management Plan (RMP) and approved by CalGEM.

capacity fell below 345 MMcfd—as it does when Aliso Canyon is full—all of the injection capacity was allocated to the balancing function during the prime trading cycle (Cycle 1). Once Aliso Canyon was filled on June 19, 2019, customers with firm injection rights were unable to inject gas into storage on Cycle 1 (represented by the blue line in Figure 3 below).

Condition 1of the Withdrawal Protocol was triggered on August 28 and September 7, which allowed SoCalGas to withdraw 115 MMcfd and 108 MMcfd from the field, respectively. As shown in Figure 3, customers with firm injection were able to inject gas into storage on Cycle 1 after these Aliso Canyon withdrawal events. Based on its analysis, CPUC staff conclude that lack of injection ability during Cycle 1 made it more difficult for customers to inject gas into storage in 2019. New balancing rules went into effect on May 1, 2020, pursuant to the Triennial Cost Allocation Proceeding decision, (D.) 20-02-045. Under these rules, the injection capacity allocated to core customers and the balancing function is prorated daily based on available capacity. As shown by the orange line in Figure 3, under these rules, injections by customers with firm injection rights continued even after Aliso Canyon filled on July 9, 2020, which helped compensate for storage withdrawals due to hot weather.

Figure 3: Cycle 1 Injection Patterns in Summer 2019 and 2020



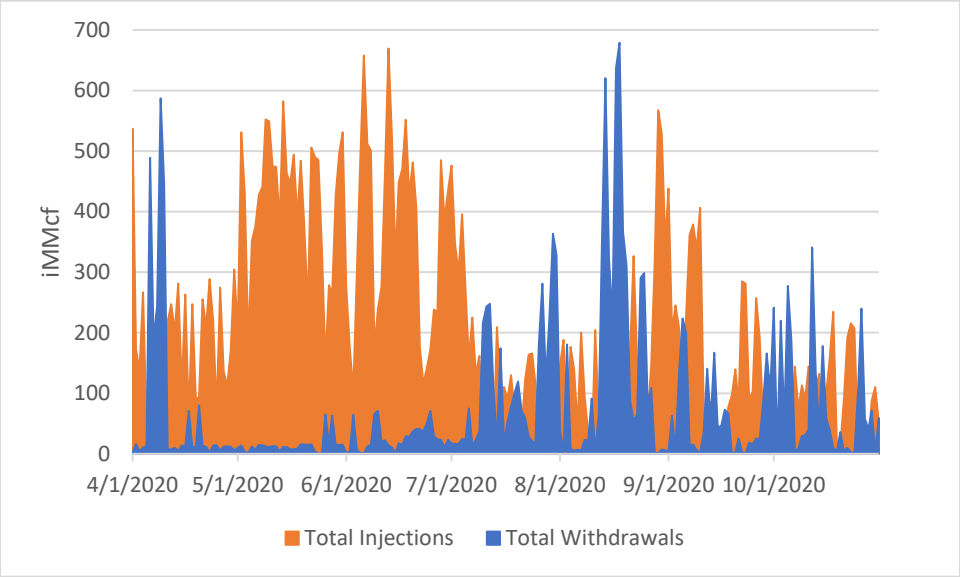
Data Source: SoCalGas Envoy

Figure 4 below illustrates the total injections and withdrawals during the summer of 2020. Withdrawals were low at the beginning of the summer as the weather was relatively mild, which helped SoCalGas' Gas Acquisition Department, which purchases gas for core customers, build and maintain storage inventories. SoCalGas injected a significant amount of gas into storage from April 1 through the first half of July. However, weather-driven demand steadily increased during the latter half of July and the beginning of August. During this time, SoCalGas frequently had Honor Rancho and La Goleta on withdrawal to fill the gap between receipts and demand.[9] As shown, the highest

[9] Since Aliso Canyon can only be used when one of the four conditions of the Withdrawal Protocol are met, the vast majority of summer storage withdrawals come from the non-Aliso fields.

withdrawals occurred during the mid-August heatwave. In September, SoCalGas was able to ramp up injections again as temperatures began to cool. SoCalGas mostly relied on Honor Rancho to fulfill withdrawal needs in September. Gas demand remained relatively high in October, and SoCalGas did not need to inject as much since the fields were nearly full.

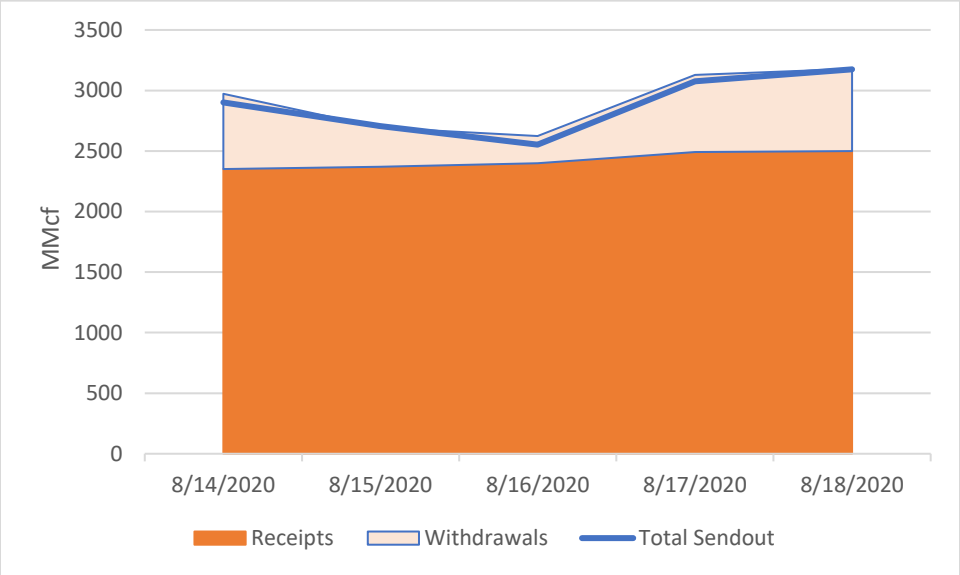
Figure 4: April-October 2020 Total Injections and Withdrawals



Data Source: SoCalGas Daily Logs

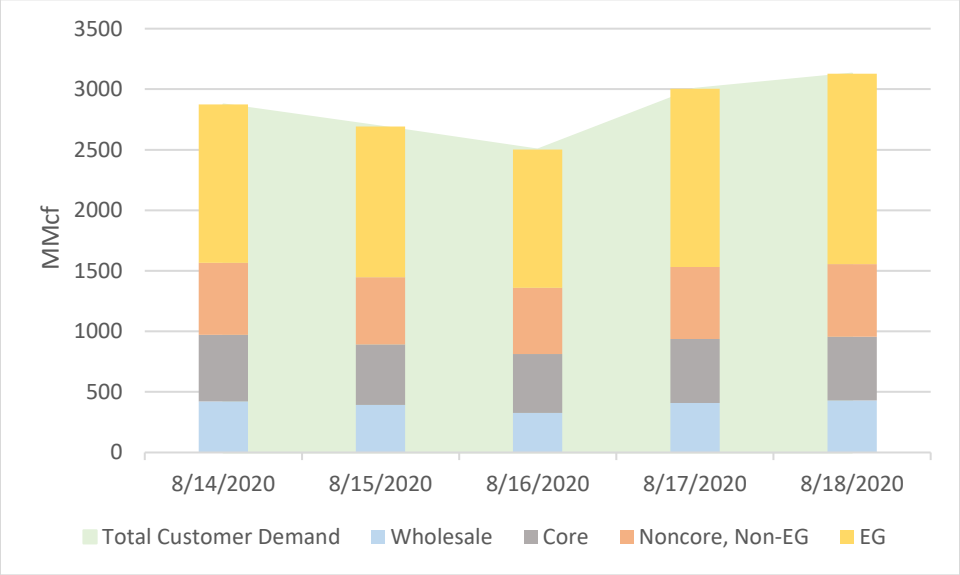
Scorching hot temperatures hit California in mid-August 2020, forcing grid operators to order rotating electric outages. SoCalGas' composite weighted average temperature during the heatwave trended in the mid-eighties. As illustrated in Figure 5 below, storage withdrawals helped fill the gap between incoming gas (receipts) and customer demand (sendout) for several back-to-back days during this hot weather event. SoCalGas withdrew gas from its four storage fields for several days in response to the increased demand on the system. Approximately 47 percent of the demand during this time came from electric generation (EG) customers. As shown in Figure 6, core customer gas demand held relatively steady and accounted for approximately 18 percent of the total demand on the system. In addition, wholesale and noncore/non-electric generation demand accounted for approximately 35 percent and also held steady. Despite these heatwaves, total storage capacity reached 94 percent full by September 30, 2020. The 2020 TCAP injection rules discussed above helped compensate for storage withdrawals due to hot weather.

Figure 5: Receipts, Withdrawals, and Total Sendout: 8/14-8/18



Data Source: SoCalGas Daily Logs and SoCalGas Data Request Response

Figure 6: Demand by Customer Class: 8/14-8/18



Data Source: SoCalGas Daily Logs and SoCalGas Data Request Response

Receipt Point Utilization

Analyzing receipt point utilization provides additional perspective to storage facility usage, since demand is filled either by pipeline or storage gas or a combination of both. The Staff analysis below shows that receipt point utilization in the summer often mirrors the weather, with more flowing gas supply on hotter, higher demand days. Another factor is the availability of storage injection capacity. When ample injection capacity is available, customers with storage rights frequently bring in more gas than they burn in order to fill storage, increasing receipt point utilization. When injection capacity isn't available, customers must balance their deliveries more closely to their burn, and receipt point utilization drops.

The figures in this section combine daily receipt point utilization from Ehrenberg, Otay Mesa, Blythe, Transwestern/North Needles, Kramer Junction, Kern/Mojave, Kern River, and Occidental Elk Hills for total system capacity utilization and the corresponding composite weighted average temperature. They are computed using actual daily receipt point capacity—which includes the impacts of maintenance and reduced pressure—as opposed to nominal receipt point capacity. Staff includes maintenance and reduced pressure in the receipt point calculation to assess customer scheduling patterns under restricted conditions.

In 2020, receipt point utilization was broadly similar to 2019, with variations related to weather and the amount of pipeline capacity and storage injection available.

Table 1: Comparison of Average Receipt Point Utilization in Summer 2019 and 2020

	2019	2020
April	91%	83%
May	93%	83%
June	87%	87%
July	80%	83%
August	84%	88%
September	88%	91%
October	73%	89%

Data Source: SoCalGas Envoy

Receipt point utilization averaged 83 percent during April 2020. In Figure 7 below, the high receipt point utilization seen during the first half of the month is primarily the result of cold weather and storage injection into Aliso Canyon (Honor Rancho was under a low inventory shut-in from March 31 through April 13). Receipt point utilization peaked from April 6 through April 10 coinciding with a dip in temperatures as shown in Figure 6. During this time, there were no injections into storage, and Aliso Canyon, La Goleta, and Playa del Rey were on withdrawal while Honor Rancho was shut in. The highest receipt point utilization during the spring injection season—96 percent—was seen on April 9 when the composite weighted average temperature dropped to 53°F. Between April 15 through 29, Aliso Canyon was closed for its annual low inventory shut-in. As a result, receipt point utilization was lower during the second half of April and rose again in May when Aliso Canyon was back in service. La Goleta was on a low inventory shut-in from May 11 through May 16. Since La Goleta does not have a large injection capacity, receipt point utilization was not as impacted by that field's maintenance activity.

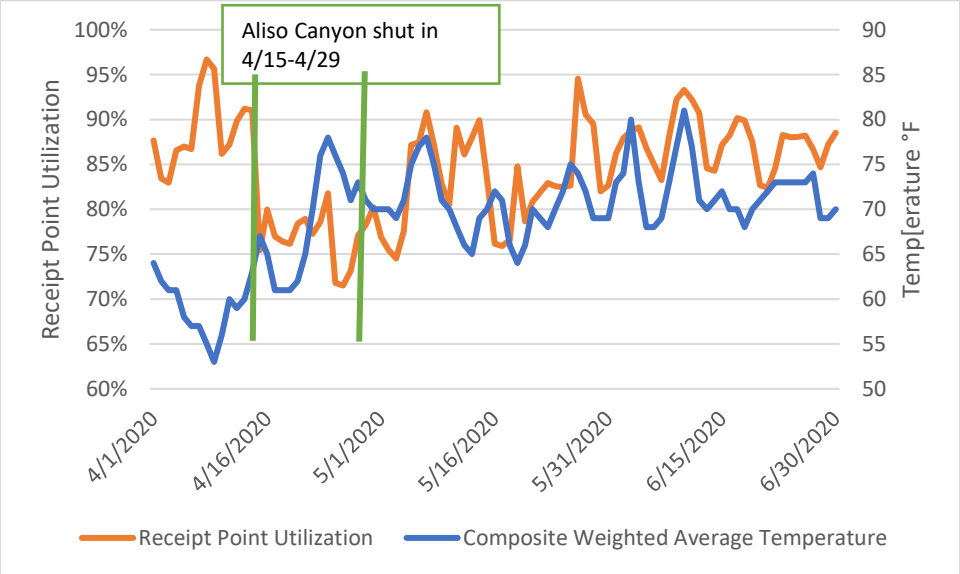
Receipt point utilization averaged 83 percent in May 2020. On two days, forecasted deliveries exceeded the amount of pipeline and injection capacity available on the system. These over-deliveries caused SoCalGas to call Stage 3 High OFOs on May 10 and May 24.

Average receipt point utilization for April and May 2020 were lower than the previous year, when they were 91 and 93 percent, respectively.[10] One factor that decreased receipt point utilization in spring 2020 compared to 2019 was the increase in overall pipeline capacity. Average available pipeline capacity during spring 2020 was 2,630 MMcfd compared to 2,497 MMcfd in spring 2019. More pipeline capacity creates a bigger denominator, so a similar amount of gas deliveries results in a lower receipt point utilization percentage.

June came with mild temperatures and low customer demand, which averaged approximately 1.9 Bcf. Receipt point capacity was only slightly impacted by the loss of Line 235-2, which was taken out of service for repairs on June 1 based on the results of the October 2019 inline inspection. The final report on the Line 235 inline inspection found 31 "Safety-Related Conditions" that required immediate remedial work.[11] When Line 235-2 was taken out of service for repairs, SoCalGas made 150 MMcfd of interruptible capacity available at Kramer Junction, which largely mitigated the impact of the 170 MMcfd loss from Line 235-2.

SoCalGas' Gas Acquisition Department maximized injections during June since customer demand was relatively mild. Average receipt point utilization was 87 percent, higher than the averages seen in April and May. There were two days when forecasted deliveries exceeded available capacity, resulting in Stage 3 High OFOs on June 6 and 7.

Figure 7: Receipt Point Utilization from April-June



Data Source: SoCalGas Envoy

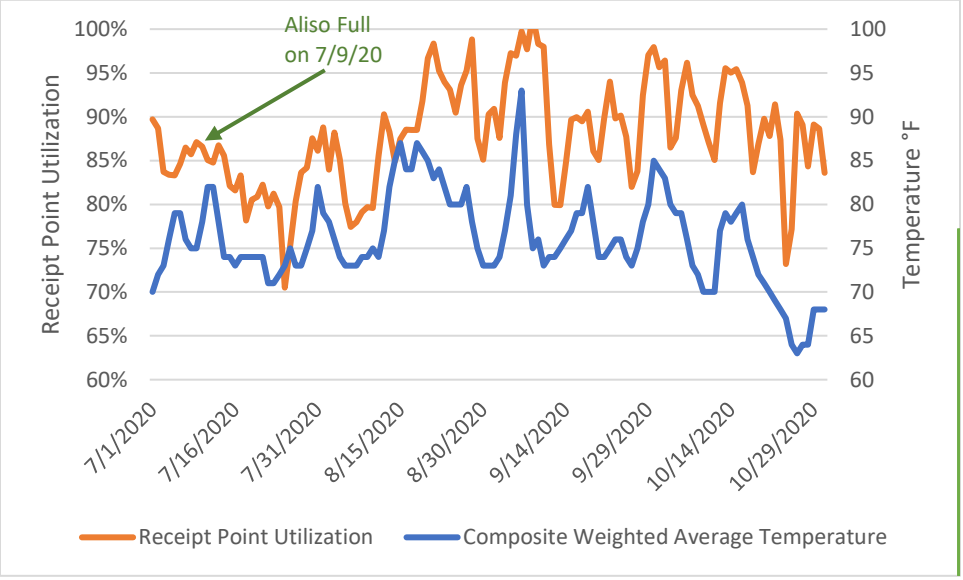
Southern Californians mostly experienced moderate summer temperatures in July 2020. Average demand during the month was 2.2 Bcf—slightly higher than in June. As shown in Figure 8 below,

[10] Summer 2019 SoCalGas Conditions and Operations Report: https://www.cpuc.ca.gov/uploadedFiles/CPUCWebsite/Content/News_Room/NewsUpdates/2020/SummerLookback2019Report-final.pdf

[11] June 12, 2020 Envoy Posting: https://scgenvoy.sempra.com/ebb/attachments/1591669562109_SoCalGas_Pipeline_Maintenance_Update_June_8_2020.pdf

Aliso Canyon became full on July 9. Receipt point utilization from July 1 through July 9 was 86 percent. Once Aliso Canyon became full, the average receipt point utilization during the rest of July dropped slightly to 82 percent. Average receipt point utilization in July was 83 percent.

Figure 8: Receipt Point Utilization July-October 2020



Data Source: SoCalGas Envoy

Receipt point utilization in August mostly trended with the weather. The average composite weighted average temperature during the first three days of August was 78°F and the average receipt point utilization was 87 percent. Temperatures dropped from August 4 through August 12, averaging 74°F during that period. Receipt point utilization during this time dropped with the temperature, averaging 81 percent. However, as shown in Figure 8 above, receipt point utilization spiked during the August 13-20 heatwave, averaging 89 percent. Electric generation demand in the SoCalGas territory averaged 1.3 billion cubic feet per day (Bcfd) during the event. As a point of comparison, electric generation activity averaged 620 MMcfd in July when temperatures were milder and demand was lower.[12]

It is worth noting that even though electric generation demand for gas was at an all-time high during this event, several outages of electric generation plants occurred as a result of extreme temperatures.[13] Total gas demand averaged 2.9 Bcfd from August 14 through August 19. When comparing the highest demand days of the last three summers, the highest demand—3.2 Bcf—occurred on August 18, 2020. The second highest demand—3.0 Bcf— occurred on July 18, 2018, during the July 2018 heatwave, which triggered gas and electric price volatility.

High temperatures continued into September. The highest composite weighted average temperature of the season—93°F —occurred on September 6 as shown in Figure 7 above. Electric generation demand rose again on September 5 and 6, averaging 1.3 Bcfon both days. Receipt point utilization trended with the weather during the first half of September. The highest receipt point utilization—

[12] SoCalGas response to Energy Division Data Request dated April 2, 2021.
[13] Page 47 of Final Report Cause Analysis Report: http://www.caiso.com/Documents/Final-Root-Cause-Analysis-Mid-August-2020-Extreme-Heat-Wave.pdf

100 percent—was seen on September 6, coinciding with the highest observed temperature. Temperatures trended downward after September 6 . The mean composite weighted average temperature dropped to 80°F the next day and continued to trend down during the next few days. The average receipt point utilization seen in September was 91 percent, and the average demand was 2.2 Bcfd. SoCalGas refilled Aliso Canyon on September 11, 2020, and the total injection capacity on the system dropped to 200 MMcfd. As a result, SoCalGas called Stage 3 High OFOs on September 19-20 and 23-27 when the forecasted injection for balancing exceeded the amount set aside for balancing purposes.

Temperatures trended downward in October as SoCalGas approached the fall injection season. Receipt point utilization in October was 89 percent. Injection capacity was still low since all four fields were near capacity. As a result, SoCalGas called Stage 3 High OFOs over 11 days in October. Honor Rancho's high inventory shut-in began on October 25 and continued into November. SoCalGas called a Stage 3.1 High OFO on October 28 and October 30, which has a higher noncompliance charge ($10/Dth) than does a Stage 3 High OFO ($5/Dth). The stage of the high OFO increased at the tail end of October because Honor Rancho was shut in, Aliso Canyon had reached its maximum allowable capacity, and the remaining injection capacity was only 75 MMcfd.

Staff review of customer behavior during the Stage 3 and Stage 3.1 High OFO events showed that customers reduced their scheduled quantities in response to the High OFO events, mostly in response to the tolerance band set by SoCalGas. For example, on June 6 and 7, the tolerance band was 15 percent, and customers only reduced their scheduled quantities by 30 MMcfd and 45 MMcfd, respectively. However, when comparing those dates with the end of October—when the tolerance band was only 2 percent and 1 percent on October 25 and October 28—customers reduced their scheduled quantities by 277 MMcfd and 171 MMcfd, respectively.

Aliso Canyon Usage

Aliso Canyon withdrawals occurred on six gas days in April, one gas day in July, nine gas days in August, and two gas days in October. All withdrawals occurred under Condition 1 of the Withdrawal Protocol. Condition 1 is triggered if preliminary low OFO calculations indicate a Stage 2 Low OFO or higher. In April, the inclusion of Aliso Canyon's withdrawal capacity eliminated the issuance of a low OFO on April 8-9. SoCalGas withdrew approximately 1.8 Bcf of gas from Aliso Canyon that month.[14] The need for withdrawals from Aliso Canyon in April was tied to relatively cold weather, as temperatures averaged 56°F during the days that Aliso Canyon was on withdrawal. In addition, Honor Rancho was on its low inventory shut-in, and therefore its withdrawal capacity was unavailable.

[14] Monthly Aliso Canyon Withdrawal Report Response Dated May 5, 2020: https://www.cpuc.ca.gov/uploadedFiles/CPUCWebsite/Content/News_Room/NewsUpdates/2020/AlisoCanyonMonthlyReport_April2020_PUBLIC.pdf

In July, SoCalGas initiated withdrawals from Aliso Canyon on July 13. A Stage 1 Low OFO was declared even after accounting for Aliso Canyon's withdrawal capacity in the low OFO calculations. SoCalGas withdrew approximately 46 MMcfd of gas from Aliso Canyon on that day.[15]

In August, SoCalGas primarily relied on Aliso Canyon's withdrawal capacity to meet the surge in electric generators' demand for gas during the excessive heat conditions. Aliso Canyon's withdrawal capacity eliminated the issuance of a Low OFO on all nine days it was used. SoCalGas initiated withdrawals from Aliso Canyon at approximately 10:57 a.m. on August 13, 2020. It had Aliso Canyon on withdrawal during every day from August 13 through August 20. Honor Rancho was on withdrawal alongside Aliso Canyon during all those days. La Goleta and Playa del Rey were intermittently on withdrawal during this time. SoCalGas withdrew approximately 3.5 Bcf of gas from storage during the mid-August heatwave and approximately 70 percent, or 2.4 Bcf, of this gas was from Aliso Canyon.

The remaining Aliso Canyon withdrawals occurred in October, eliminating the issuance of a Low OFO on both gas days. SoCalGas withdrew approximately 320 MMcfd of gas from the facility in October. Staff review of the confidential information that led to a determination of a Stage 2 or higher Low OFO in SoCalGas' preliminary calculations for each withdrawal event indicates that SoCalGas complied with the Withdrawal Protocol.

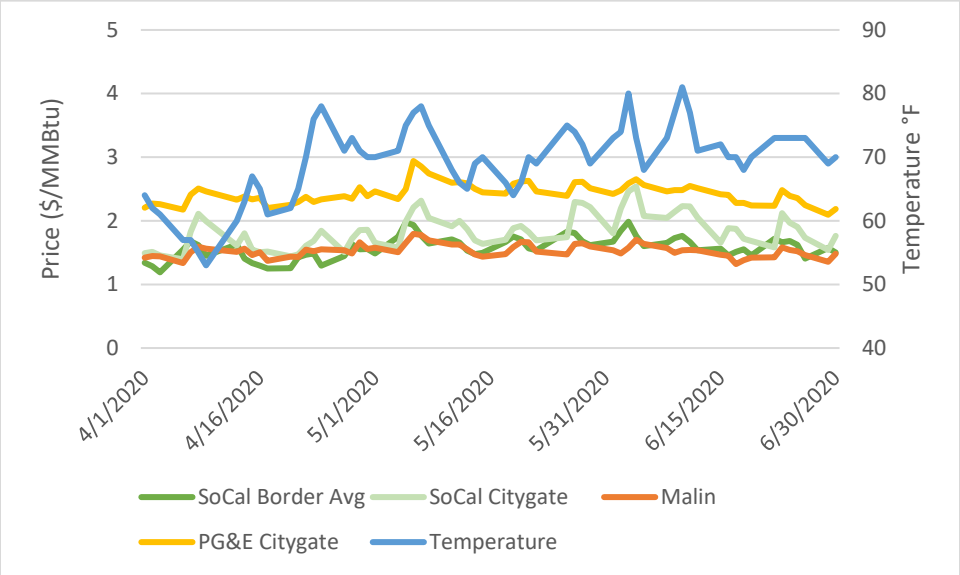
Natural Gas Prices

Figures 9-10 below show gas prices at PG&E Malin,[16] PG&E Citygate, SoCal Border, and SoCal Citygate, then overlay the composite average temperatures in Southern California. Figure 9 shows the average gas prices from April 1 through June 30, 2020. As shown by the dark green line and the dark orange lines, SoCal Border and PG&E Malin prices generally tracked one another. The maximum spread between the two hubs was only $0.03/MMBtu from April 1 through June 30. The maximum spread between SoCal Citygate and PG&E Citygate was $0.59/MMBtu from April 1 through June 30. As shown in Figure 8, prices remained under $3/MMBtu throughout the first half of the summer. In April and May, gas prices at SoCal Border and SoCal Citygate frequently traded under $2/MMBtu. There were no notable price spikes or volatility in the California gas markets during this time due to moderate weather, high storage inventories, and a decline in the futures market. It is also worth noting that there were no major transmission lines out of service for the first summer in several years.

[15] SoCalGas Monthly Aliso Canyon Withdrawal Report Dated August 5, 2020: https://www.cpuc.ca.gov/uploadedFiles/CPUCWebsite/Content/News_Room/NewsUpdates/2020/AlisoCanyonMonthlyReport_July2020_PUBLIC.pdf

[16] Malin is a PG&E receipt point on the California border.

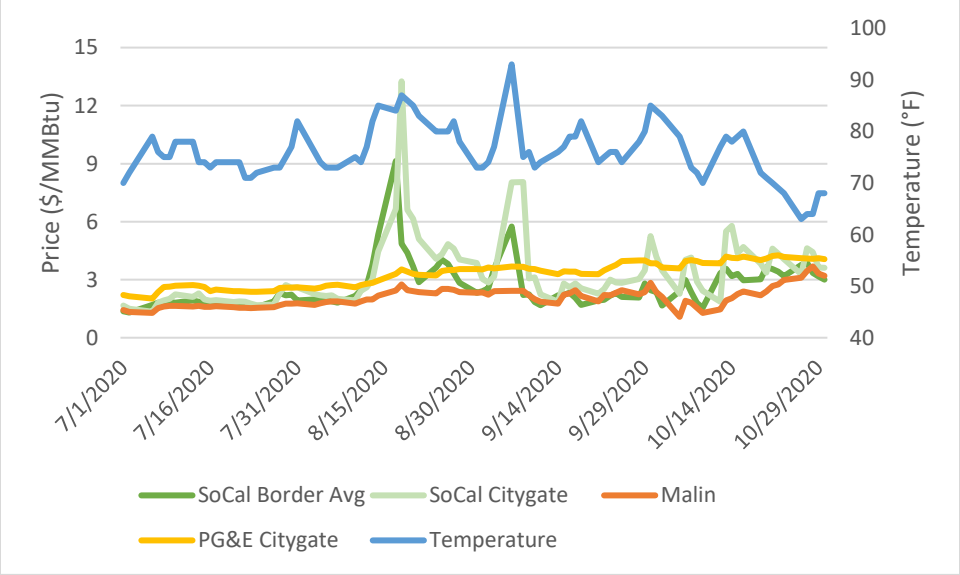
Figure 9: Gas Prices in April-June 2020



Data Source: Natural Gas Intelligence

As illustrated in Figure 10 below, gas prices in all four hubs stayed under $3/MMBtu in July as temperatures continued to be mostly mild. The spread between Malin and PG&E Citygate was greater than the spread between SoCal Citygate and SoCal Border.

Figure 10: Gas Prices in July-October 2020



Data Source: Natural Gas Intelligence

While the August heatwaves impacted the entire state, gas prices in Northern California remained stable as illustrated by the light and dark orange lines. The lack of an escalation in prices may be attributed to more access to storage than is available in Southern California. In contrast, gas prices in Southern California became more volatile as temperatures soared. Average SoCal Border prices hit $9.14/MMBtu on August 17, and the average SoCal Citygate price peaked at $13.26/MMBtu on August 18. Despite the volatility in Southern California compared to PG&E, prices were relatively

tame compared to the July 2018 heatwaves when SoCal Citygate prices peaked at $39. During the July 2018 weather event, Aliso Canyon was not used because it was considered an "asset of last resort," and Line 235-2 was out of service for repairs, which meant there was a much tighter margin between supply and demand.

After the heat storm ended and CAISO called off the Flex Alerts, SoCal Citygate prices slowly moderated, dropping to $2.85/MMBtu on September 2. However, as illustrated in Figure 10 above, gas prices in the Southern California markets crept back up over Labor Day weekend, which can be attributed to a combination of factors, including higher temperatures and high electric demand.[17] Additionally, during the first two weeks of September, solar-powered generation in the CAISO region dropped nearly 30 percent from the July 2020 average due to wildfire smoke.[18] SoCal Citygate prices peaked at $8/MMBtu on September 8, which coincided with several Southern California wildfires, including the Valley, Creek, and Bobcat fires. One of the last notable price spikes in the SoCal Citygate market, albeit a relatively minor one, occurred on September 30 when the average price hit $5.25/MMBtu. The price spike was largely a result of high electric demand as another heatwave hit the state. As illustrated in Figure 10, temperatures in the region were nearly as high as during the mid-August heat storm. The last price spike of the season occurred on October 14 when SoCal Citygate hit $5.78/MMbtu as a result of higher-than-average temperatures in the region.

Lastly, Staff reviewed the quantity of traded volumes in the gas markets during the month of August and compared those to gas prices. Border trades were higher than SoCal Citygate trades in the beginning and end of August when electric generation demand was relatively low and injections into storage were high. Receipts were also higher than sendout. Thus, the SoCal Border trades are most likely a result of Gas Acquisition activity since Gas Acquisition holds a large amount of firm transmission contracts and holds most injection rights.[19] As shown in Figure 10 below, the highest traded volume was in the SoCal Citygate market for gas day August 18, 2020—the highest electric generation demand day of the summer. Demand in the SoCal Border market was relatively tame in comparison. Electric generators typically do not rely on firm interstate transmission contracts for most of their gas burn needs.[20] Thus, it is likely that it was electric generators who were forced to rely on spot market purchases, which drove up Citygate prices. Staff also reviewed confidential data provided by SoCalGas on electric generation hourly profiles. On August 18, hourly electric generation demand kept rising incrementally from the morning hours until it hit peak hourly

[17] CAISO Report on System and Market Conditions, Issues and Performance August and September 2020, pg 11: http://www.caiso.com/Documents/ReportonMarketConditionsIssuesandPerformanceAugustandSeptember2020-Nov242020.pdf

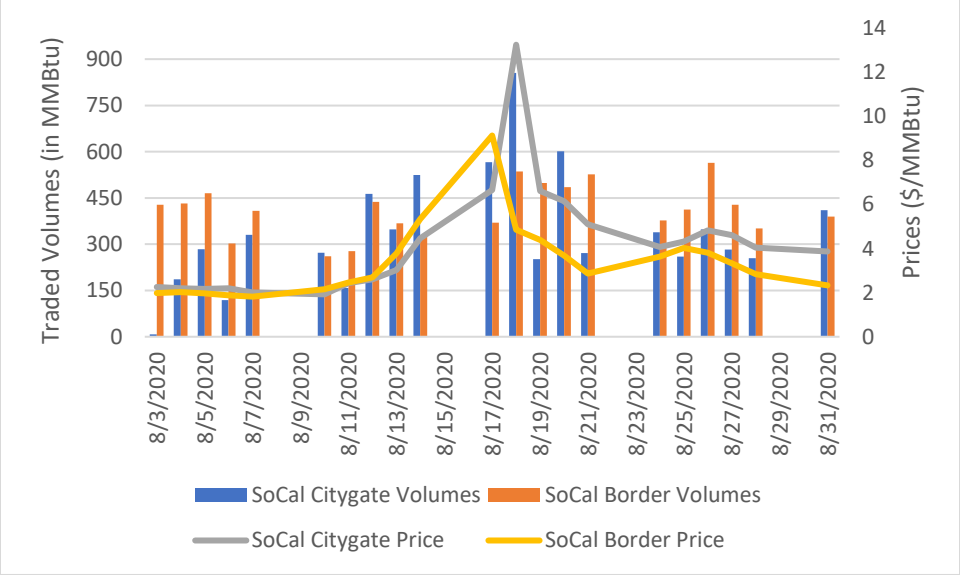
[18] US EIA "today in Energy" Notice: https://www.eia.gov/todayinenergy/detail.php?id=45336

[19] CPUC Decision 04-09-022, page 13

[20] Western Interconnection Gas — Electric Interface Study, pg 12: https://www.wecc.org/Reliability/Western%20Interconnection%20Gas-Electric%20Interface%20Study%20Public%20Report.pdf

demand at 2:00 pm, which then persisted through the evening hours. The impacts to electric market prices are discussed in the next section of this report.

Figure 11: Traded Volumes and Gas Prices August 3-August 31, 2020



Data Source: Natural Gas Intelligence

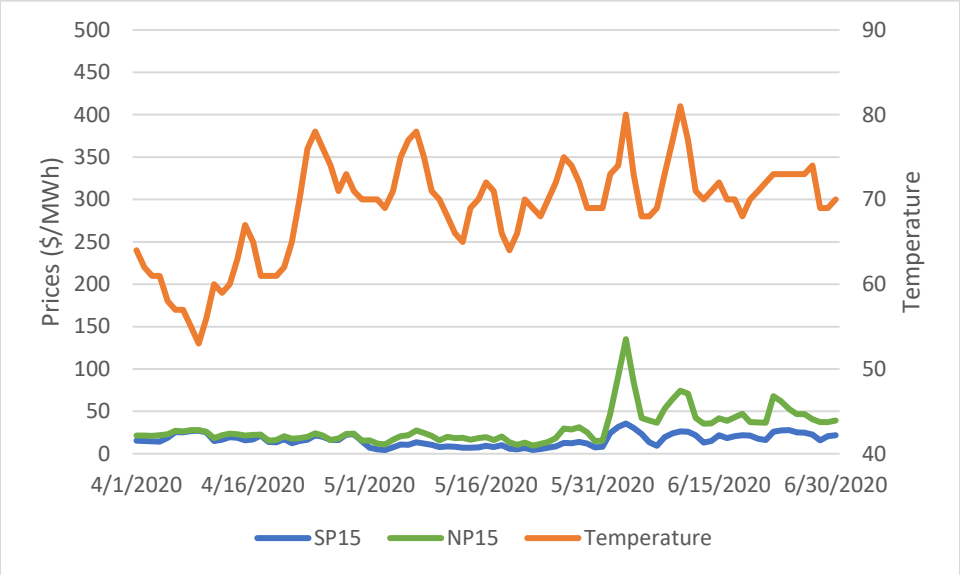
Electricity Prices

This report includes a discussion of electricity prices because a significant portion of electric generation in California is gas-fired, and electricity prices tend to reflect natural gas trends. During the first half of the summer, electric prices were generally stable except for a few price spikes that occurred in Northern California in June. NP15 prices hit an average of $135.18 per megawatt hour (MWh) on June 3 and generally trended higher than SP15 prices throughout that month. The high electric prices in the north may have been driven by congestion.[21] Wholesale energy costs from April through June were lower than at the same time in 2019. CAISO attributed the decrease in average wholesale electric prices in 2020 to a 20 percent decrease in natural gas prices compared to the same period in 2019.[22]

[21]CAISO Q2 2020 Report on Market Issues and Performance, pg 42: http://www.caiso.com/Documents/2020SecondQuarterReportonMarketIssuesandPerformance-Oct62020.pdf

[22] Id, pg 25.

Figure 12: Electric Prices April-June 2020[23]



Data Source: CAISO Oasis

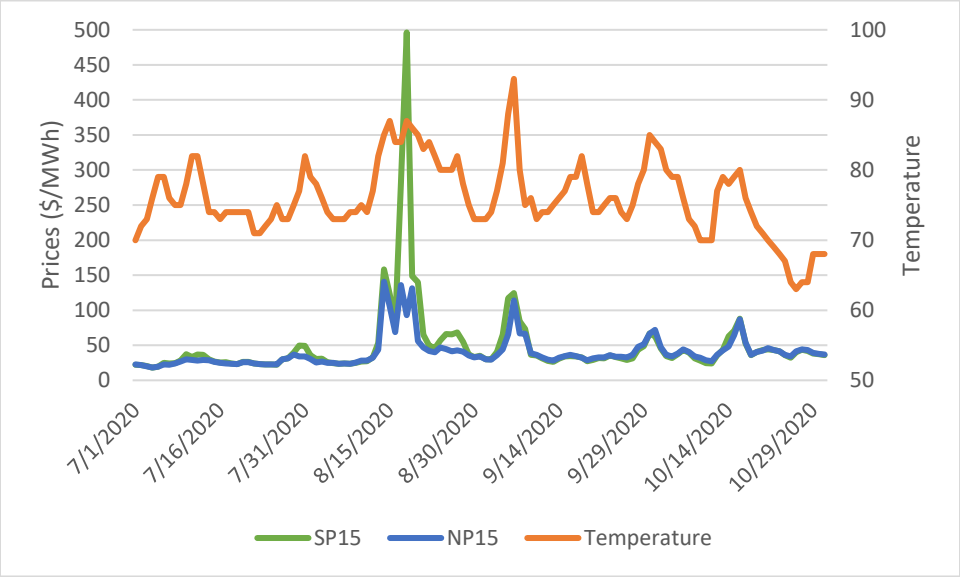
Electric prices throughout July were stable, with no notable price spikes. As illustrated in Figure 13 below, both SP15 and NP15 prices shot upwards during the mid-August heatwave. In NP15, electric prices went from an average of $43.60/MWh on August 13 to a high of $140.64/MWh the next day. NP15 prices averaged $112.40/MWh until the weather event ended. SP15 prices were even more volatile. Prices went from an average of $53.03/MWh on August 13 to $158.16 the next day. A combination of factors prompted CAISO to declare Stage 2 and Stage 3 emergencies and order rotating outages across the state on August 14 and 15. First, other Western U.S. states also faced excessive heat, preventing California from relying on out-of-state power imports. Other factors that contributed to the crisis included power plants tripping offline due to high temperatures and weather conditions limiting use of solar and wind power.

On August 14, 18, and 19, actual demand exceeded the 1-in-2-year CAISO load forecast. Day-ahead and real-time market prices quickly rose on August 14 and 15 during some of the early evening hours. On August 14, peak load was forecasted to be a little over 45,750 MW in the day-ahead market. However, actual demand was about 1,000 MW more than the day-ahead forecast.[24] At 6:38 p.m. on August 14, the CAISO declared a Stage 3 Emergency and ordered rotating electric outages because it was failing to meet its Western Electricity Coordinating Council (WECC) reserve requirement. CAISO had maximized the use of generation resources, and solar was quickly falling while demand remained high. At 8:38 p.m., the CAISO downgraded from a Stage 3 to Stage 2, and Stage 2 was cancelled at 9:00 p.m. as system conditions improved. On the afternoon of August 15, solar declined by more than 1,900 MW due to storm clouds, while demand was still increasing. In the early evening hours, wind generation declined by 1,200 MW. At 6:16 p.m. CAISO declared a Stage 2 emergency, which was upgraded to a Stage 3 Emergency about 12 minutes later. Like August 14, all available generation was online, but it was not enough to meet the rapidly increasing customer

[23] Temperatures are based on the SoCalGas composite weighted average temperature.
[24] CAISO Q2 2020 Report on Market Issues and Performance, pg 6: http://www.caiso.com/Documents/2020SecondQuarterReportonMarketIssuesandPerformance-Oct62020.pdf

demand. At 6:48 p.m., the Stage 3 Emergency was cancelled because wind production had increased more than 500 MW. The CAISO eventually downgraded the emergency declaration from a Stage 3 to a Stage 2. The Stage 2 was cancelled at 8 p.m.

Figure 13: Electric Prices July-October 2020



Data Source: CAISO Oasis

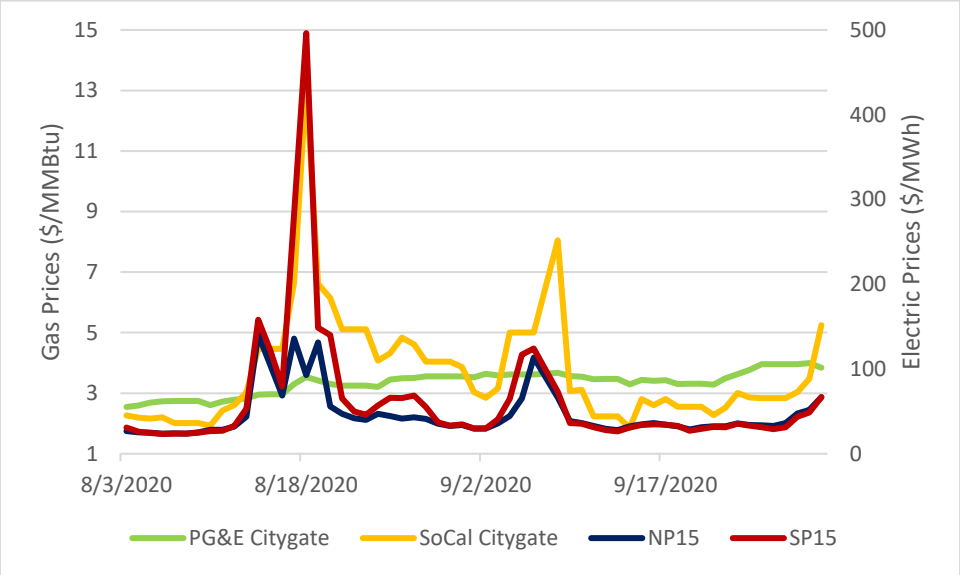
On August 17 through August 18, the day-ahead forecasted electric load was higher than the 1-in-10-year peak forecast. However, actual demand was significantly less than both forecasts due largely to voluntary conservation efforts.[25] The highest average price in SP15 was seen on August 18 when prices hit $496.24/MWh, which is the same day that saw record demand levels for gas-fired generation.

The only other notable price spike seen during the summer occurred during Labor Day weekend when another heatwave engulfed California. Electric demand was again projected to exceed the 1-in-10-year peak forecast on September 6. Actual demand was high, but lower than forecast, exceeding the 1-in-2 forecast and reaching levels close to August 14 and 18. NP15 prices averaged $65.40/MWh and SP15 prices averaged $117.11/MWh on September 5. NP15 prices averaged $113.76/MWh and $124.32/MWh in SP15 on September 6. Like August 17 through 19, there was considerable conservation from the public, which explains the difference between the day-ahead load forecast versus the actual demand. Actual demand peaked at 47,236 MW on September 6, which exceeded the levels observed during the mid-August heatwave.[26]

As illustrated in Figure 14 below, gas and electric prices in Northern California did not experience nearly as much volatility as did prices in Southern California. Both SoCal Citygate and SP15 experienced shockwaves during the mid-August heatwave. Prices in both markets quickly came back down but trended upward again during Labor Day weekend when Southern Californians experienced another heatwave, which coincided with several wildfires in the region.

[25] Id, 12.
[26] Id, 9.

Figure 14: Average Gas and Electric Prices August-September 2020



Data Source: Natural Gas Intelligence and CAISO Oasis

Closing Summary

Overall, conditions during summer 2020 were notably different from those in summer 2019. Summer 2019 started out with markedly low non-Aliso storage inventory levels due to a stretch of cold weather that drew down inventory during the preceding winter. In contrast, summer 2020 started out with a fair amount of non-Aliso storage inventory because storage usage was more balanced during winter 2019-20 than in winter 2018-19. This is due both to milder weather and to changes to the Aliso Canyon Withdrawal Protocol, which allows SoCalGas to use the field more flexibly to help balance the inventory levels of the non-Aliso fields. Another notable difference between the two summers was that temperatures in 2019 were relatively mild compared to summer 2020. In August 2020, a heatwave hit California and the rest of the West coupled with reduced renewable generation due to cloudy conditions from thunderstorms and wildfire smoke, which resulted in rotating electric power outages across the state. SoCalGas' gas system was in a better position to respond to surges in electric generation demand than in previous years since it was able to access Aliso Canyon under Condition 1 of the Withdrawal Protocol and because there were no major transmission lines out of service during the heatwaves. Even so, gas and electric prices soared to $13.36/MMBtu and $496.24/MWh at the SoCal Citygate and SP15, respectively. The rotating blackouts that occurred because of insufficient power supplies exposed vulnerabilities within California's electric grid.

Part of the CPUC's mission is to ensure energy reliability for Californians. This endeavor includes planning for risks related to extreme weather events and other impacts of climate change. In the face of increasing volatility and interstate competition for energy resources, the CPUC must address the challenge of ensuring an adequate and reliable supply of energy, even as it considers changes to California's gas system.

Appendix A: Glossary of Terms

This appendix contains additional information on terms used in the report.

Composite Weighted Average Temperature: A calculation that approximates the temperature in a gas utility's entire service territory by first taking the average daily temperature of several locations in the service territory, applying a weight to each location, and then averaging those into one number.

Cooling Degree Day (CDD): A widely used unit of measurement to compare the average temperature for a location. CDDs measure how hot the temperature was on a given day or during a period of days. One CDD is when the average temperature for the day raises one degree above 65° Fahrenheit. Note: CDDs listed in this section reflect SoCalGas' territory, excluding the San Diego Gas & Electric (SDG&E) service area.

Gas Day: A Gas Day is from 7:00 AM to 7:00 AM.

Operational Flow Order (OFO): For natural gas pipeline systems to remain physically "in balance," they must operate within a set range of pressures. If there is not enough gas in the system, the pressure falls, and gas does not flow properly. If there is too much gas, the pressure rises, posing a risk to the structural integrity of the pipelines. SoCalGas' OFO penalty structure from June 1 to September 30 includes the following stages and noncompliance charges: Stage 1 ($0.25/Dth), Stage 2 ($1.00/Dth), Stage 3 ($5/Dth), Stage 4 ($5/Dth), and Stage 5 ($5+G-IMB daily balancing standby rate). SoCalGas' OFO penalty structure from October 1 to May 31 includes the following stages and noncompliance charges: Stage 1 ($0.25/Dth), Stage 2 ($1/Dth), Stage 3 ($5/Dth), Stage 3.1 ($10/Dth), Stage 3.2 ($15/Dth), Stage 3.3 ($20/Dth), Stage 4 ($25/Dth), and Stage 5 ($25+ G-IMB daily balancing standby rate in $/Dth).

The SoCalGas System Operator is responsible for maintaining the system's balance, but it does not control most gas procurement. To maintain balance, the system operator calls low OFOs when gas deliveries are too low and high OFOs when deliveries are too high. When an OFO is called, customers are required to balance supply and demand within a specified tolerance band; otherwise, they face specified financial penalties for noncompliance.

NP15: The portion of the CAISO controlled transmission grid north of Path 15, designated as the Northern Active Congestion Management Zone in the CAISO Electric Tariff filed with FERC, and does not include or encompass any load zone, path, or control area outside of California or external to transmission interfaces within the electrical region under CAISO's control.

Receipt Point Utilization: The ratio between the actual amount of gas flowing through a gas pipeline receipt point on a given day and the maximum operating capacity of that receipt point.

Shut-In: Regulations enacted by the California Geologic Energy Management Division (CalGEM formerly the Division of Oil, Gas, and Geothermal Resources or DOGGR) in 2018 require semiannual storage field shut-ins for testing and inventory verification. SoCalGas schedules each storage field to be shut-in for compliance procedures and maintenance during the shoulder, or off-peak, seasons of spring and fall. Low inventory shut-ins are typically scheduled in April or May, and

high inventory shut-ins are typically scheduled in September, October, or November. These shut-ins may result in reduced opportunities for storage field injection.

SoCalGas' Gas Acquisition Department: Responsible for procuring gas for SoCalGas and SDG&E core customers, which are made up of residential and small business customers. There is a firewall between Gas Acquisition and the System Operator; Gas Acquisition only has access to public information about the SoCalGas system.

SP15: The portion of the CAISO controlled transmission grid south of Path 15, designated as the Southern Active Congestion Management Zone in the CAISO Electric Tariff filed with FERC, and does not include or encompass any load zone, path, or control area outside of California or external to transmission interfaces within the electrical region under CAISO's control.

Appendix B: SoCalGas System Map

This map created by SoCalGas depicts receipt points with black and white circles and the maximum amount of gas that could be transported through the receipt points assuming no maintenance and no pipelines operating at reduced pressure.