NRDC

April 28, 2021

Trisha Osborne
Assistant Commission Secretary
Public Utilities Commission of Nevada
1150 East William Street
Carson City, NV 89701-3109

Re: Docket No. 19-12019
Investigation to Determine if Chapter 704 of the Nevada Administrative Code Needs to be Amended to Allow for a Review of Long-Term Natural Gas Procurement Contracts

Dear Ms. Osborne:

The Natural Resources Defense Council hereby submits for filing its Reply Comments in Response to Procedural Order No. 3.

Thank you,

/s Dylan Sullivan
Dylan Sullivan

Senior Scientist
Climate & Clean Energy Program

Enclosures

NATURAL RESOURCES DEFENSE COUNCIL
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BEFORE THE
PUBLIC UTILITIES COMMISSION OF NEVADA

Investigation to Determine if Chapter 704 of the Nevada Administrative Code Needs to Be Amended to Allow for a Review of Long-Term Natural Gas Procurement Contracts	|	Docket No: 19-12019

NATURAL RESOURCES DEFENSE COUNCIL'S REPLY COMMENTS IN RESPONSE TO PROCEDURAL ORDER NO. 3

April 28, 2021

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1. INTRODUCTION

On March 11, 2021, the Public Utility Commission of Nevada issued Procedural Order No. 3 in Docket No. 19-12019. Pursuant to this order, Southwest Gas Corporation ("Southwest Gas" or "SWG") and Nevada Power Company/Sierra Pacific Power Company d/b/a NV Energy ("NV Energy") (collectively, the "companies" or "utilities") submitted comments on their long-term methane gas planning processes on April 14, 2021.[1] The Natural Resources Defense Council ("NRDC") submits these comments in response to the utilities' comments.[2]

2. OVERVIEW OF UTILITY RESPONSES

a. Southwest Gas

SWG's gas forecast methodology is described in testimony filed in the Annual Rate Adjustment proceeding.[3] SWG relies on regression analysis of historical data to define equations that relate daily gas use per customer to temperature (as reflected by heating degree days, or HDD). These equations, which are described as "the anchor" of SWG's forecast methodology, are used in conjunction with forecasts of the number of customers.[4] The customer forecasts are based on short-term and long-term trends in customer growth, adjusted for current and expected future economic and housing market conditions.[5] SWG's peak design day demand is based on extreme HDDs that have occurred in each district since 1988.[6]

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[1] We use the term "methane gas" in place of the term "natural gas" used in the utilities' filings. We use "fossil gas" or "biomethane" when necessary to distinguish specific sources.

[2] NRDC prepared these comments with assistance from Synapse Energy Economics, Inc.

[3] See, Prepared Direct Testimony of James L. Cattanach, filed May 27, 2020 in PUCN Docket No. 20-05028.

[4] Id., p. 3.

[5] Id., p. 6.

[6] Southwest Gas Corporation's Comments in Response to Procedural Order No. 3, p. 7.

SWG believes that, while monthly and annual HDD may decline, climate change may also cause extreme weather events to be more severe.[7] According to SWG, it would therefore be imprudent to use a lower design day HDD for long-term demand forecasting.

On the other hand, SWG believes that it would be premature to incorporate electrification driven by climate change mitigation policies into long-term gas demand forecasts because Nevada does not presently have any electrification mandates.[8] SWG further indicates that, "…in the event such policies are subsequently adopted, the Company's existing process for updating demand forecast should be sufficient to reflect any impact those policies may have on future customer growth and customer demand without the need for further modifications."[9]

SWG concludes that "its long-term planning process is sound and considers climate change and other emerging natural gas demand influencers appropriately."[10]

b. NV Energy

For the residential, small commercial, and industrial service classes, NV Energy uses time series econometric modeling of historical customer, economic, and demographic data to project monthly customers and sales per customer. Gas sales forecasts are the product of customers and sales per customer. For other rate classes, NV Energy uses a trend method based on past history and known large customer changes to project gas sales.[11]

NV Energy uses effective heating degree days (EHDD) to forecast annual peak demand.[12] NV Energy's EHDD is based on the extreme weather that occurred on December 9, 1972.[13] NV

[7] Southwest Gas Corporation's Comments in Response to Procedural Order No. 3, p. 11-12.
[8] Id., p. 13.
[9] Ibid.
[10] Ibid.
[11] NV Energy 2020 (September 1). 2020 Natural Gas Information Report. Docket No. 20-09001. p. 12.
[12] Comments of Nevada Power Company and Sierra Pacific Power Company in Docket No. 19-12019, p. 2.
[13] Ibid.

Energy uses a regression model for its residential customer count forecast, which is driven by a population forecast developed based on recent customer growth.[14]

NV Energy maintains that, although climate change is causing warmer weather throughout the year and impacting sales, the design day demand should be based on "the risk of an extreme event occurring, not increasing overall temperatures."[15] Further, NV Energy states that "research indicates that climate change will result in more extreme weather events as the climate warms" and that, therefore, design day demand should not be decreased lest we increase the risk of outages due to an extreme winter weather event.[16]

3. ISSUES WITH UTILITY FILINGS

a. SWG's planning processes appears to lack objectivity

The planning process creates opportunities for gas company personnel to incorporate their own opinions and biases into the forecast results. For example, in SWG's Annual Rate Adjustment application, Mr. Cattanach states:

> *"For the most part, the forecasts pass the reasonableness tests, but occasionally, they do not because they may be too low or too high. In these instances, the forecasts are adjusted based both on quantitative and qualitative analysis and professional judgement based on a long-tenure and expertise modelling and forecasting natural gas demands in Southwest Gas' service areas. When required, a forecast is typically adjusted by scaling the applicable HDD regression coefficient until the forecast is reasonable."*[17]

As this quote shows, the way that SWG develops forecasts does not appear to be objective. Improvements could be made to reduce subjectivity and improve the transparency of the forecasts.

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[14] Id., p. 4.
[15] Id., p. 5.
[16] Ibid.
[17] Southwest Gas Corporation. 2020 (May 27). Prepared Direct Testimony of James L. Cattanach, p. 8. Docket 20-05028.

b. The utilities' planning processes do not adequately address likely future developments

Neither utility sufficiently accounts for potential and expected changes in end-use technologies and customer behaviors that are not observed in historical trends. For example, based on a review of Mr. Cattanach's testimony in Docket 20-05028, it appears that SWG's load forecasts do not take into account energy efficiency programs, building energy codes, appliance standards, and other policies and programs that reduce overall gas consumption and peak loads.[18] While NV Energy adjusts the gas load forecast for the impacts of its energy efficiency & conservation programs, it does not appear to consider electrification.[19]

Despite assertions to the contrary,[20] the lack of consideration of these and other potential developments means that the utilities' forecasting practices are unable to take into account a future that is likely to be different from the past. The combination of state and federal policies, the adoption of new technology, and changes in customer behavior caused by greater awareness of climate issues will affect the future demand for methane gas. Regression analyses based on past years will eventually incorporate these changes, but they are poorly suited to making future-oriented decisions such as the choice to build long-lived infrastructure. With respect to electrification, it may be several years until a regression of historical data would reveal a trend, since there has been little policy direction for electrification over the span of the past few decades. Any regression analysis that relies on long-term historical consumption trends would not adequately detect a new electrification trend, which is expected to accelerate in the future.

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[18] Id.
[19] See, NV Energy 2020 (September 1). 2020 Natural Gas Information Report. Docket No. 20-09001. p. 7.
[20] E.g., see Southwest Gas Corporation's Comments in Response to Procedural Order No. 3, p. 13.

Thus, a methodology based on historical trends would not accurately predict—and would likely underestimate—the impact of future electrification.

4. RECOMMENDATIONS

a. Long-term gas demand forecasts should address future policy and technological developments

Long-term gas demand forecasts should include scenarios in which changes in environmental policy and gas use technology cause customer growth rates and gas use coefficients to deviate from historical trends and expectations.

i. Environmental policy

In 2019, Nevada established greenhouse gas (GHG) emission reduction goals of 28 percent below 2005 levels by 2025 and 45 percent by 2030, and required evaluation of policies to achieve zero greenhouse gas emissions by 2050.[21] The most recent state GHG inventory and projection shows that, under current policies and practices, the state will miss these targets by 4 percentage point in 2025 and 18 percentage points in 2030.[22] This inventory projects an increase in residential and commercial building emissions through 2040 under current policy.

It is unreasonable for the gas utilities to expect that there will be no changes in policy related to building emissions, including emissions from methane gas combustion, in response to this projected failure to meet state GHG targets. In fact, state actions already show signs of the development of new policies and programs:

[21] Nevada Revised Statutes 445B.380(2)(c) and (d).

[22] Nevada Division of Environmental Protection. 2020. *Nevada Statewide Greenhouse Gas Emissions Inventory and Projections, 1990-2040*. https://ndep.nv.gov/uploads/air-pollutants-docs/ghg_report_2020.pdf.

- The Nevada Climate Initiative[23] states that "In order to meet Nevada's long-term goal of zero or near-zero greenhouse gas (GHG) emissions by 2050, transitioning away from natural gas is necessary. While Nevada's electricity sector transitions from fossil fuels to zero-emissions renewables, the state must also transition from fossil-fuel combustion in homes and commercial buildings in the form of burning gas for cooking, hot water, and space heating." (page 2)
- Of particular relevance to long-term gas forecasts and the need for new capacity, the Nevada Climate Initiative states that "A potential first step in a phased transition from gas would be to allow consumers the choice between gas and electric on existing buildings but require all-electric in new construction. This would preclude establishing new pipelines, thus avoiding future stranded assets. New pipelines would also lock in emissions for years, weakening Nevada's ability to meet emissions-reduction goals according to Pathways and Policies to Achieve Nevada's Climate Goals." (page 2)
- Governor Sisolak stated on April 19, 2021 that "To meet the State of Nevada's goal of net-zero greenhouse gas emissions by 2050, we must reduce the amount of natural gas used in Nevada."[24]

The inevitable policy response to the need to hit GHG targets is not limited to state policy. On April 22, 2021, the Biden administration formalized the country's updated "nationally determined contribution" (NDC) to the United Nations Framework Convention on Climate

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[23] State of Nevada Climate Initiative. *Natural Gas in Nevada.* https://climateaction.nv.gov/wp-content/uploads/2021/03/NCI-Natural-Gas-Fact-Sheet.pdf.

[24] Nevada Office of the Governor. April 19, 2021. "Nevada Leadership Calls For Continued Discussion on the Future of Natural Gas", https://gov.nv.gov/News/Press/2021/Nevada_Leadership_Calls_For_Continued_Discussion_on_the_Future_of_Natural_Gas/

Change under the Paris Agreement, setting the target at 50 to 52 percent below 2005 levels by 2030.[25] Specific to the buildings sector and gas utility planning, the White House states that "The United States can create good-paying jobs and cut emissions and energy costs for families by supporting *efficiency upgrades* and *electrification* in buildings through support for job-creating retrofit programs and sustainable affordable housing, wider use of *heat pumps and induction stoves*, and adoption of modern energy codes for new buildings. The United States will also invest in new technologies to reduce emissions associated with construction, including for high-performance *electrified* buildings." (Emphases added.) Federal policy action and investment to achieve this commitment should be expected and incorporated in long-term utility planning.

According to Nevada's GHG inventory, direct building-sector emissions make up only 11 percent of the state's current emissions. It is thus theoretically possible for the state's statutory 2030 target to be met without reduction in fossil gas consumption. However, to hit this goal emission reductions will be required from all sectors because all sectors have inertia, infrastructure, and stock turnover limits. For example, it is not reasonable to assume that the state will be able to reduce transportation sector emissions faster than a timescale set by the lifetime of vehicles. Even if all vehicles sold today were electric, there would still be substantial tailpipe emissions after 2030. Allowing time for market transformation further extends this timeframe. Analysis conducted by Evolved Energy, GridLab, NRDC, and Sierra Club in 2020 showed that in a 2030-compliant scenario, pipeline gas use declines by 14 percent by 2030, on the way to

[25] The White House. April 22, 2021. "FACT SHEET: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies", https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/.

nearly complete elimination by 2050.[26] These reductions are accomplished through a combination of electrification and a substantial (more than 10x) increase in the pace of building shell improvements. Buildings with electric heating systems have no winter peak gas demand, while those with retrofitted building shells but that retain gas heating will nonetheless require less gas during the coldest periods. Rapid changes of this sort in building equipment and performance are not captured by a backward-looking model for peak gas demand.

ii. Technology change

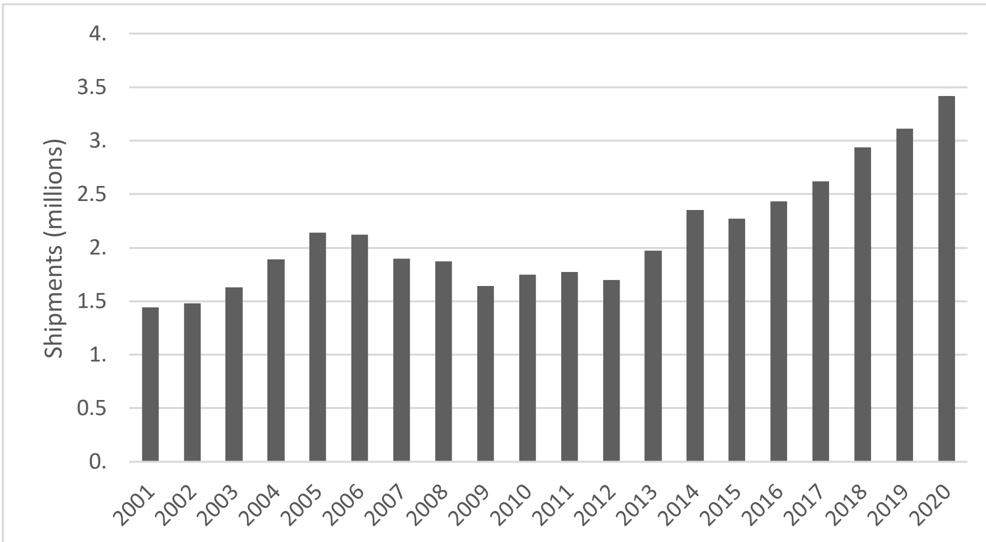
Even without a state mandate, technology and building characteristics are changing and will continue to change. Among other technologies, the availability of advanced heat pump systems (e.g., inverted heat pumps and mini-split heat pumps) has increased substantially over the past several years in the U.S. market. Such heat pumps have dramatically improved their heating performance under freezing temperatures (at or below 5^{o} F), while continuing to offer highly efficient cooling performance.[27] A 2018 study by the Southwest Energy Efficiency Partnership found that air-source heat pumps (ASHP) are already cost-effective on a lifetime basis against methane gas heating for new residential construction in Nevada and other southwestern states, while they are still slightly more expensive for retrofit projects.[28]

The adoption of heat pumps has also increased substantially over the past several years. As shown in Figure 1, the number of ASHP shipments in the U.S. doubled from 1.7 million to 3.4

[26] Evolved Energy, GridLab, NRDC, and Sierra Club. 2020. *Pathways and Policies to Achieve Nevada's Climate Goals: An Emissions, Equity, and Economic Analysis*. Figure 23, Page 52. https://gridlab.org/wp-content/uploads/2020/10/GridLab_Nevada-Report.pdf.
[27] Southwest Energy Efficiency Partnership (SWEEP). 2018. Benefits of Heat Pumps for Homes in the Southwest. Available at: http://www.swenergy.org/Data/Sites/1/media/documents/heat-pump-study-2018-06-11-final.pdf.
[28] Id. pages 17 and 19.

million over the past 7 years starting around 2013. The trend of increasing shipments appears to have started well before 2013, interrupted only during the great recession from 2007 to 2012.

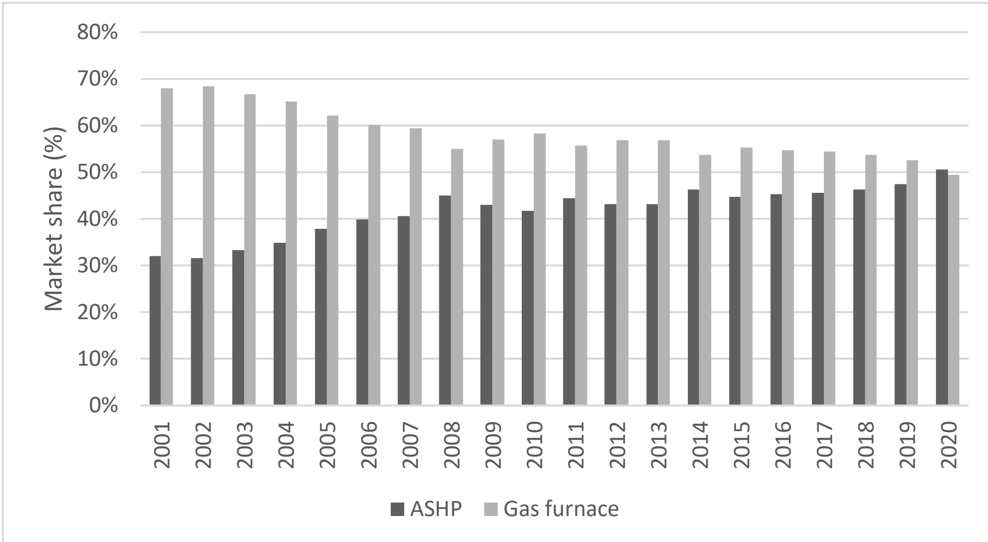
Figure 1. U.S. ASHP Shipments, 2001–2020



Source: Statista "U.S. air-source heat pump shipments 2001-2020" based on shipment data from AHRI. Available at https://www.statista.com/statistics/220358/air-source-heat-pump-shipments-in-the-us-since-2001/.

During the last 20 years, annual shipments of gas furnaces have also increased in absolute terms, but gas furnaces' overall market share has shrunk as heat pump sales have burgeoned. As shown in Figure 2, the market share of ASHPs was about 30 percent in 2001 and rose to 50 percent in 2020, assuming that gas furnaces and heat pumps constitute the entire heating equipment market. On the other hand, the share of gas furnaces declined from nearly 70 percent in 2001 to 50 percent in 2020.

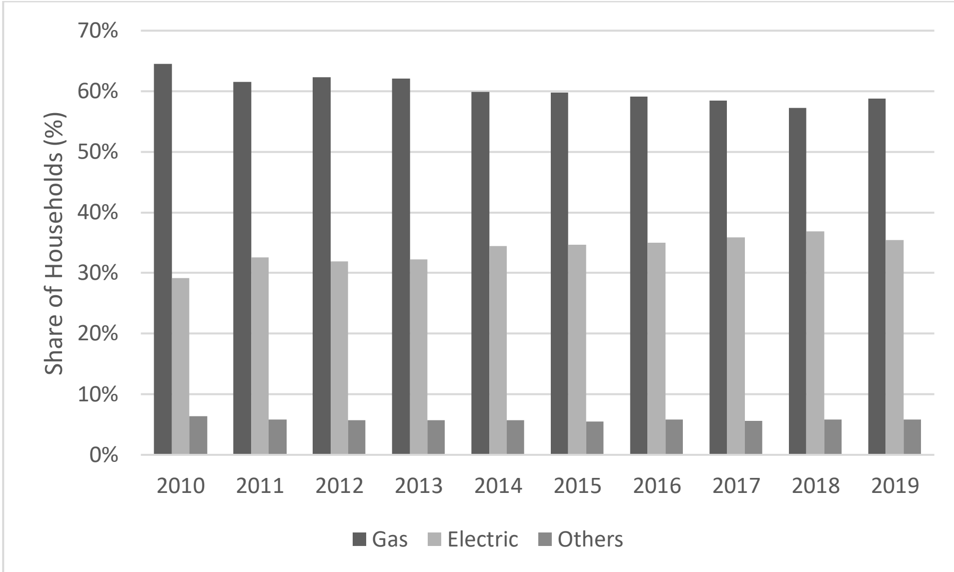
Figure 2. Share of ASHPs and Gas Furnaces, 2001–2020



Source: Statista "U.S. air-source heat pump shipments 2001-2020." Available at www.statista.com/statistics/220358/air-source-heat-pump-shipments-in-the-us-since-2001/; Statista."Gas warm air furnace shipments in the U.S. from 2001 to 2020," Available at: www.statista.com/statistics/220820/gas-warm-air-furnace-shipments-since-2001/.

We also observe an increase in the penetration of electric heat systems such as heat pumps in Nevada. The Census Bureau tracks the number of households by the type of heating fuel in the American Community Survey (ACS). According to this survey, homes with gas heating decreased from 65 percent in 2010 to 59 percent in 2019, while homes with electric heating increased from 29 percent to 35 percent during the same period as shown in Figure 3.

Figure 3. Residential Heating Fuel Share in Nevada



Source: Calculated based on U.S. Census Bureau. American Community Survey 2019 5-Year Estimates Detailed Tables, House Heating Fuel, Table B25040. Available at https://data.census.gov/cedsci/table?q=residential%20heating%20fuel&g=0400000US32&hidePreview=true&tid=ACSDT5Y2019.B25040&vintage=2018&tp=false&moe=true.

While we have not had the opportunity to evaluate the utilities' load forecast models in detail, if those models do not show slower methane gas heating customer growth than growth in the number of households (associated with falling market share for gas heating vs. heat pumps) then they are not accurately capturing market trends. It is also vital to capture recent trends in market adoption of gas furnaces and heat pumps. Further, recent data should carry more weight than old data. To the extent the utilities rely on outdated heating market trends, their model predictions are not credible for projecting future gas demand.

b. Long-term gas demand forecasts should utilize a risk-based approach for accounting for extreme weather effects

i. Peak design load day needs a solid statistical foundation

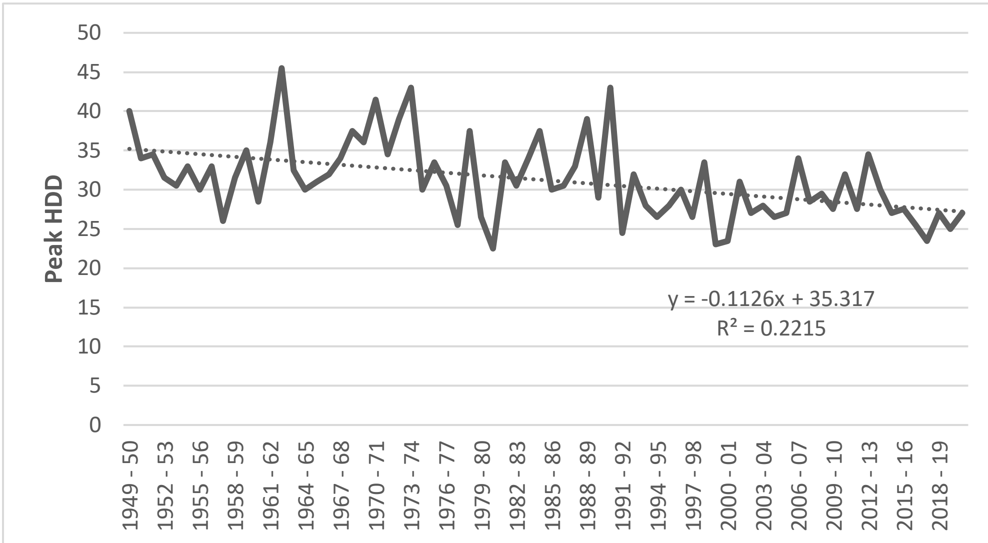
The peak design conditions should be analytically and statistically determined rather than based on the coldest day in the historical record. For electrical systems the 1 hour in 10 years loss of load probability is the accepted standard, and there are established technical methods for calculating that. Likewise, climate change needs to be factored into the calculation.

Using a shorter and more recent period for the peak HDD analysis, e.g. 20 or 30 years, would reduce both the average peak value as well as the variation. Doing so would provide a more solid technical basis for design day conditions. Also, probabilities could be calculated based on the more recent data and statistics, such as one day in 20 years for example.

Figure 4, the peak heating degree day in SWG's service territory for the location in Nevada with the longest (72 years) historical temperature records has been declining since the records started, and especially so in the period after 1991. The range of the extremes has also decreased over this period. The average peak HDD in the first 36 years was 33.4 HDD with a standard deviation of 4.81, whereas in the more recent 36 years the average was 29.0 HDD with a standard deviation of 4.11. That represents a 13 percent decline in the average and a 15 percent decline in the standard deviation.

Using a shorter and more recent period for the peak HDD analysis, e.g. 20 or 30 years, would reduce both the average peak value as well as the variation. Doing so would provide a more solid technical basis for design day conditions. Also, probabilities could be calculated based on the more recent data and statistics, such as one day in 20 years for example.

Figure 4. Peak HDD for D20 and D21 (S. NV), 1949–2020



Source: Southwest Gas Corporation. "Statistical Analysis Extreme Heating Degree Days Update April 12, 2021," provided to NRDC via email dated April 15, 2021.

The companies assert that climate change can result in more extreme conditions,[29] but climate change is primarily associated with increased temperatures, changes in rainfall, and more extreme storm events, and not so much in colder temperatures.[30] The warming and melting of the Artic illustrates the general pattern. Based on the historical record shown in the previous figure, neither the average nor the variation in the peak HDD have been increasing in this region.

ii. System capacity should be economically based

A basic principle of utility regulation is to analyze the tradeoffs of cost and benefits. The customers should have a reasonable level of service, but also at a reasonable cost. Analysis should consider the relative economics of the risks and alternative methods of addressing them. For example, does it make more economic sense to the company and the customers to overbuild

[29] See, e.g., Southwest Gas Corporation's Comments in Response to Procedural Order No. 3, p. 11.
[30] For example, see: NASA. The Effects of Climate Change. https://climate.nasa.gov/effects/.

the supply system for unlikely cases or to consider ways of managing extreme loads? Designing a system based on peak conditions 50 years ago appears to be excessive for the present, and it is not supported by data provided by SWG. The applicants need to provide adequate data to make that assessment possible.

iii. Scenario-Based Forecasting

Scenario-based forecasting is a useful approach for addressing future uncertainties. The probability of a given future may be unknown, but considering the various possibilities allows the exploration of key factors and possible solutions. It provides insight into possible futures. An example in the current case is the degree of end-use electrification, which could increase modestly or substantially. Given that uncertainty, scenarios are likely to show that short-term solutions that can be scaled up or down are preferable to large, long-term investments, as the short-term commitments provide more flexibility to respond as actual future conditions become more certain.

5. CONCLUSION

This concludes our comments.