<u>BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION</u>

IN THE MATTER OF THE JOINT APPLICATION FOR APPROVAL TO ACQUIRE NEW MEXICO GAS COMPANY, INC. BY SATURN UTILITIES HOLDCO, LLC.	**Case No. 24-00266-UT**

Direct Testimony of

Stefani L. Penn

on Behalf of

Coalition for Clean Affordable Energy

Dated April 18, 2025

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EXHIBIT LIST

I. INTRODUCTION AND OVERVIEW

Q: State your name and briefly describe your qualifications, including education, experience, and expertise.

A: My legal name is Stefani Lynette Penn Harvey. Professionally, I go by Stefani Penn. I am a Principal at Industrial Economics, Inc. ("IEc"), an environmental and economic consulting firm located at 2067 Massachusetts Avenue, Cambridge, MA 02140. I am appearing in this proceeding on behalf of the Coalition for Clean Affordable Energy ("CCAE").

My expertise is in environmental health applications across policy, regulation, and pollution mitigation scenarios. I have applied my expertise in methods development, benefits assessment, distributional analyses, energy equity, environmental justice, communications, risk assessment, and air quality management planning applications, for public sector, utility, and non-government organization ("NGO") clients.

At IEc, I have worked for federal government agencies including the U.S. Environmental Protection Agency ("EPA") Offices of Policy, Air and Radiation, Land and Emergency Management, Environmental Justice and External Civil Rights, and the Administrator; the Federal Energy Regulatory Commission ("FERC"); and the Bureau of Ocean Energy Management ("BOEM"). I have worked for state agencies including the New York State Energy and Research Development Agency ("NYSERDA"), the South Coast Air Quality Management District, and the Connecticut Department of Energy and Environmental Protection ("DEEP"); and utilities including Eversource in Massachusetts, Commonwealth Edison in Illinois, and Southern California Gas Company in California. Beyond my own work at the firm, IEc also maintains corporate sustainability, natural resource damage assessment, regulatory analysis, and financial forensics practices, among other topic areas.[1]

I achieved a PhD in Environmental Health from Boston University School of Public Health in 2015; a MS in Exposure Assessment from the University of Washington Department of Environmental and Occupational Health Sciences in 2011; and a BS in Chemistry from Carnegie Mellon University in 2007.

My resume is attached as Exhibit SP-1. It is accurate and up to date.

Q: Have you previously testified before the New Mexico Public Regulation Commission ("PRC")?

A: No, I have not previously testified before the New Mexico PRC.

Q: Will you be sponsoring any exhibits?

A: Yes, I will be sponsoring the following exhibits:

Exhibit SP-1	Resume of Stefani L. Penn
Exhibit SP-2	Joint Applicants Response to Interrogatory CCAE 1-1
Exhibit SP-3	Conventional Air Pollutant Health Damages Analysis
Exhibit SP-4	Data Center Analysis

Q: What is the purpose of your testimony?

A: The purpose of my testimony is to analyze and monetize costs to New Mexicans of adverse health effects from increased emissions of conventional air pollutants associated with the Bernhard Capital Partners' ("BCP") purchase of the New Mexico Gas Company ("NMGC"). "Conventional air pollutant" is a name for substances that are emitted into the air from common sources, like the combustion that fuels residential heating systems or gas burning stoves. Criteria air pollutants, as regulated by the U.S. EPA, are conventional pollutants that have an impact on

[1] More information about IEc can be found at www.indecon.com

human health. In this testimony, I discuss emissions of the criteria pollutants nitrogen oxides (“NOx”), sulfur dioxide (“SO2”), and particulate matter (“PM”) that contribute to concentrations of ambient or outdoor fine particulate matter (“PM2.5”) and ozone. Scientists have identified a causal relationship between exposure to PM2.5 and adverse health effects as well as exposure to ozone and adverse health effects. Because of these well-known exposure pathways, I focus on the relationship between natural gas combustion, concentrations of PM2.5 and ozone, and the costs to society from adverse health effects that are associated with increased concentrations of PM2.5 and ozone.

Q. Do these “conventional air pollutants” include greenhouse gases?

A. No, they do not. My colleague, Angela Vitulli, discusses emissions of greenhouse gases and the public interest, as well as New Mexico’s greenhouse gas emission targets, in her testimony.

Q: What analyses did you perform?

A: To support this testimony, I performed two separate analyses. The first analysis estimates the costs to society (also known as damages) from the adverse health effects from residential natural gas combustion associated with expansion of NMGC customer base, resulting from BCP’s purchase of the utility.[2] Within this analysis, I evaluate the costs to society from the adverse health effects from three scenarios: a) a baseline (no change) scenario, b) a scenario that meets the State’s climate goals, and c) the BCP purchase scenario. The analysis can be found in Exhibit SP-3. The second analysis examines the possibility of a data center locating in the NMGC service area. It estimates the costs to society from the adverse health effects from natural gas

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[2] Adverse health effects from exposure to conventional air pollutants include premature mortality, respiratory impacts like asthma and lung cancer, cardiovascular impacts like heart disease and myocardial infarctions or heart attacks, loss of productivity, and related hospital admissions and emergency department visits. Each of these health effects incurs costs to the affected individual, their families, their insurance company, and society more broadly.

combustion associated with NMGC providing energy to three types of hypothetical data centers: a) a small data center connected to the electricity grid, b) a large data center connected to the electricity grid, and c) a large data center that is connected to a non-gridded natural gas system that generates energy on site. The analysis can be found in Exhibit SP-4. I use the same scenarios as my colleague Angela Vitulli uses in her analysis of the greenhouse gas impacts of the transaction.

Q: Should the PRC consider emission of conventional pollutants in deciding whether approval of the proposed acquisition is in the public interest of the State of New Mexico?

A: Yes, absolutely. Emissions of conventional pollutants into the air are detrimental to the public health and detrimental to the public interest. The costs associated with these emissions weigh heavily against approval of the proposed NMGC acquisition.

Provided in 2024 dollars, the proposed acquisition will lead to an average of $9,167,851 per year in costs to society from the adverse health effects from the expanded residential customer base on the low end and $13,320,170 per year in costs to society from adverse health effects from the expanded residential customer base on the high end from 2025 through 2040, or a total of costs to society from adverse health effects from 2025 through 2040 of between $137,079,697 and $199,166,232. If NMGC were instead to reduce its emissions sufficiently to meet the State's climate goals – decreasing emissions of greenhouse gases will necessarily decrease emissions of conventional air pollutants – New Mexicans would save an average of $2,505,011 in costs to society from adverse health effects per year on the high end and $1,724,136 in costs to society from adverse health effects per year on the low end between 2025 and 2040, or a total difference of $40,080,174 on the high end and $27,586,178 on the low end from 2025 through 2040. Even absent meeting the State's climate goals and instead continuing on with the status quo in the baseline scenario, New Mexicans would save an average of $872,280 in costs to society from adverse health effects per year on the high end and $600,370 in costs to society from adverse health effects per year on the low end in sticking with Emera as NMGC owner between 2025 and 2040, or a total difference of $13,956,482 on the high end and $9,605,921 on the low end from 2025 through 2040.

Further, creation of potential new data centers that are supplied by NMGC will lead to increased costs to society from adverse health effects from natural gas combustion.[3] In 2024 dollars, a 5 megawatt (MW) city-based gridded data center will create between $350 in costs to society from the adverse health effects per year on the low end and $760 in costs to society from the adverse health effects per year on the high end. A 100 MW site-based gridded data center will create between $7,009 in costs to society from the adverse health effects per year on the low end and $14,813 in costs to society from the adverse health effects per year on the high end. A 100 MW site-based non-gridded natural gas data center will create between $714,620 in costs to society from the adverse health effects per year on the low end and $808,428 in costs to society from the adverse health effects per year on the high end.

Q: Summarize your conclusions and recommendations.

A: In this testimony, I conclude that the purchase of NMGC by BCP will lead to an increase in costs to society from the adverse health effects from residential combustion emissions when compared with scenarios where NMGC meets the State's climate goals and where the status quo is maintained and the purchase does not move forward. Further, I conclude that NMGC supplying gas to new or expanded data centers will lead to an increase in emission from natural

[3] While BCP indicated via discovery no plans regarding expanding NMGC services to data centers, additional research provides evidence to the contrary. See Ms. Vitulli's testimony for more information.

gas combustion, both as part of the electricity grid and as a non-gridded natural gas system on site at the data center.

I recommend that New Mexico PRC take into consideration the costs of these harmful air pollutants, which strongly suggest that the PRC should not approve the purchase of NMGC by BCP.

Q: How is your testimony organized?

A: My testimony is organized in alignment with the analyses I describe above; first, I describe the costs to society from the adverse health effects that are associated with residential natural gas combustion from an expanded NMGC customer base between 2025 and 2040, then I describe the costs to society from the adverse health effects that are associated with natural gas combustion fueled hypothetical data centers between 2025 and 2040.

Q: How do the State's greenhouse emissions goals, which Ms. Vitulli will be discussing, relate to emissions of conventional air pollutants?

A: Very simply, reducing emission of greenhouse gases will also reduce emissions of conventional air pollutants. Conventional air pollutants are emitted from various anthropogenic and natural sources, including combustion of fossil fuels to generate energy. These conventional air pollutants, which are regulated by the U.S. EPA as "criteria pollutants," are emitted from both leaks of natural gas from the distribution system and from combustion of natural gas. For example, natural gas itself consists of more than 85% methane, which is a potent greenhouse gas. Leaks of natural gas from piping, valves, and other infrastructure create methane emissions. Moreover, combustion of natural gas generates emissions of carbon dioxide ("CO2"), methane, and nitrous oxide ("N2O"), all of which are greenhouse gases. Combustion of natural gas also generates emission of several conventional pollutants: NOx, carbon monoxide ("CO"), SO2, fine particulate matter (less than 2.5 microns in diameter) and course particulate matter (between 2.5 and 10 microns in diameter) ("PM2.5" and "PM10"), and volatile organic compounds ("VOCs").[4] Conventional pollutants are harmful to human health, and adverse health effects create costs for those who are exposed to these conventional air pollutants. For example, people who get sick from exposure to air pollutants may require health care, medications, hospital admissions or emergency department visits, missed work, decreased productivity, and decreased wellbeing – all of which lead to out of pocket costs for individuals and their families and costs to health insurers. NOx and VOCs also react in the atmosphere to form stratospheric or ground-level ozone ("O3"), another conventional pollutant that is harmful to human health. Efforts to reduce greenhouse gases to meet State climate goals also reduce emissions of co-generated conventional air pollutants, therefore creating air pollutant-related co-benefits from achieving greenhouse gas reduction goals.

Q: Why is a change in conventional air pollutant emissions of concern to the State of New Mexico?

A: Increased emissions of conventional air pollutants contribute to increased concentrations of these pollutants in outdoor air. Human exposure to certain air pollutants, including those that result from natural gas combustion, cause or contribute to adverse health effects in exposed populations, including respiratory and cardiovascular diseases, hospitalizations, emergency department visits, exacerbation of other diseases, and risk of premature mortality. These health effects lead to costs to society from the adverse health effects. Economists measure these damages using willingness to pay ("WTP") metrics, which provide an estimate of the maximum

[4] Eastern Research Group, "Emission Factor Documentation for AP-42 Section 1.4 Natural Gas Combustion," U.S. Environmental Protection Agency Office of Air Quality Planning and Standards, 1998. https://www.epa.gov/sites/default/files/2020-09/documents/background_document_ap-42_section_1.4_natural_gas_combustion.pdf.

amount that people are willing to pay to avoid increased risk of disease, or using cost of illness ("COI") metrics, which capture the direct medical cost of specific illnesses.[5] Regulatory impact analyses in support of federal regulations use both WTP and COI estimates to estimate the costs and benefits of policies that decrease health effects, acknowledging that WTP is a more holistic measure of the non-compensated pain and suffering that people experience when in poor health. Both valuation methods create reasonable estimates of the costs that society incurs from exposure to harmful air pollutants. Increased outdoor (or ambient) air pollution leads to degraded health and wellbeing of the people in New Mexico.

II. JOINT APPLICANTS' PLANS FOR GROWING NMGC'S CUSTOMER BASE

Q: What are the Joint Applicants' stated plans for growing NMGC's Customer Base, including residential, commercial, and industrial customers?

A: The Joint Applicants forecast that NMGC will acquire 22,000 new customers between 2026 and 2030 at a rate of approximately 4,300 per year.[6] Joint Applicants anticipate that the majority of these new customers (21,309) will be Residential (Rate 10). The remainder will be distributed as follows: 678 Small Volume (Rate 54), four Medium Volume (Rate 56), and nine Irrigation (Rate 30). The Joint Applicants predict that NMGC will spend $85.5 million between 2026 and 2029 (approximately $21 million per year) on distribution system expansion under the "Distribution Blankets – New" spending category.[7]

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[5] WTP and COI metrics are the main methods that health economists employ to estimate the costs of adverse health effects. While WTP is a more comprehensive metric than COI since it captures the full value, COI data are often more readily available and more practical to use.

[6] JA Response to CCAE 1, 1-1a, pg. 4, attached as Exhibit SP-2.

[7] *Id.*

Q: How do these growth plans impact emissions of conventional air pollutants?

A: The Joint Applicants' plans for growing NMGC's customer base will increase emissions of conventional air pollutants through the increased need for natural gas combustion to meet the heating requirements of the larger customer base. Conventional air pollutant emissions grow as demand for gas grows; increased gas use will generate higher ambient or outdoor concentrations of criteria pollutants like fine and coarse PM, NOx, CO, ozone, and SO2. Increased indoor combustion of natural gas also creates an increase in indoor emissions, as well, but I do not consider indoor air quality quantitatively in my analysis.

III. RESIDENTIAL SPACE HEATING AIR POLLUTANT EMISSIONS AND HEALTH IMPACTS ANALYSIS

Q: Describe your analysis of the costs to society from the adverse health effects from conventional air pollution if NMGC increases its residential customer base. What scenarios did you use?

A: To understand the costs to society from the adverse health effects of increased conventional air pollutant emissions from natural gas system expansion, I considered three different NMGC residential customer acquisition scenarios: Baseline, Approved Transaction, and Meets State Goals (Figure 1), consistent with Ms. Vitulli's testimony.

Figure 1. Total NMGC Residential Customers by Scenario

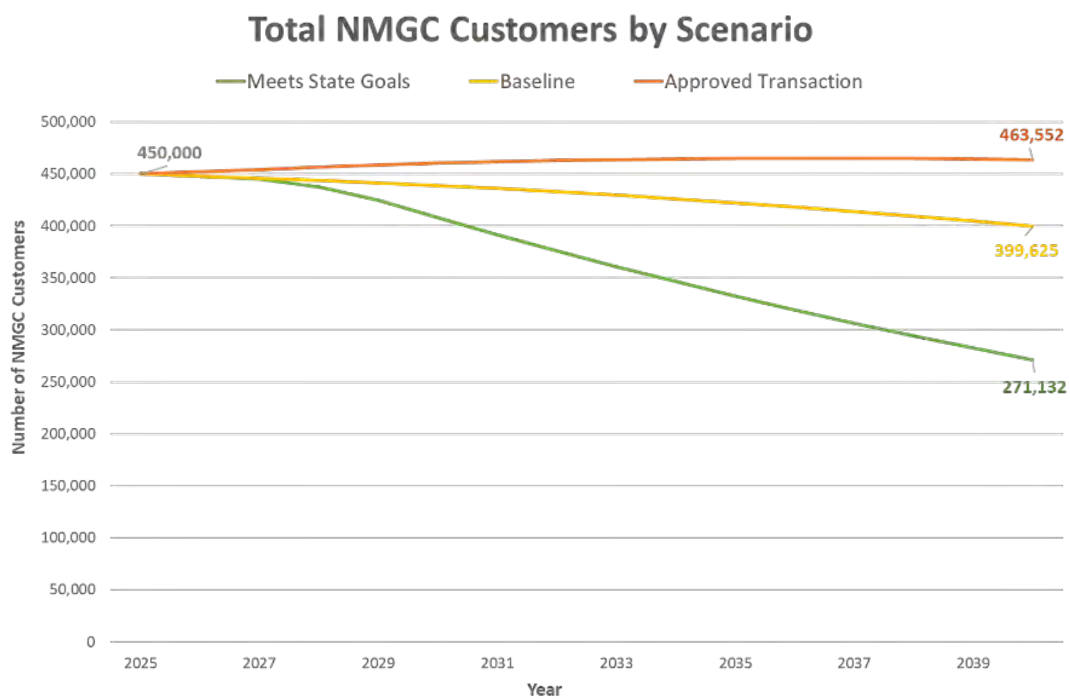

Figure 1 shows the change in NMGC customers between 2025 and 2040 across the three scenarios I analyze. Across all three scenarios, I assume NMGC begins with 450,000 residential customers in 2025 (NMGC 2023 Rate Case Final Order).[8] I relied on Ms. Vitulli's analysis to extend the residential customer base to 2040.

Q: Why did you focus only on residential customers for this analysis?

A: I focused on residential customers for this analysis because the Joint Applicants indicate negligible anticipated growth in the commercial and industrial sector, as the majority of new customers are of residential rate.[9] Because this analysis does not consider new commercial or

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[8] NMGC 2023 Rate Case Final Order, Case No. 23-00255-UT, Stipulation Exhibit #4, pg. 165.

[9] JA Response to CCAE 1, 1-1a, pg. 4, attached as Exhibit SP-2.

industrial customers, this is a conservative estimate of costs to society from adverse health effects from the increased customer base.

Q: Why did you focus only on outdoor or ambient air quality for this analysis?

A: I focus only on the costs to society from the adverse health effects associated with exposure to increased air pollution in *outdoor* air from residential natural gas combustion used for heating. Natural gas combustion for heating also adversely affects *indoor* air quality, but modeling indoor air quality related effects requires specific information about individual homes, like their size, ventilation system, how well they are sealed from outdoor air, and what other sources of air pollution are present. Cooking with a gas stove also generates increased air pollutant emissions through natural gas combustion, but modeling cooking-related health impacts also requires specific information about individual homes. Therefore, my estimate of costs to society from adverse health effects associated with an increase in customers associated with the BCP purchase of NMGC includes only the effects of residential natural gas combustion in outdoor air. For this reason, too, it is a conservative estimate.

Q: Describe the logic employed by the analysis and the data sources.

A: For the analysis of residential combustion-related costs to society from adverse health effects across scenarios, I employ emissions factors from the U.S. EPA's AP-42 that relate the amount of pollutants emitted from specific activities to calculate the quantity of NOx, SO2, VOC, and primary PM2.5 emissions from residential heating for all NMGC households by year.[10] Next, I

[10] Eastern Research Group, "Emission Factor Documentation for AP-42 Section 1.4 Natural Gas Combustion," U.S. Environmental Protection Agency Office of Air Quality Planning and Standards, 1998. https://www.epa.gov/sites/default/files/2020-09/documents/background_document_ap-42_section_1.4_natural_gas_combustion.pdf.

use U.S. EPA's CO-Benefits Risk Assessment Health Impacts Screening and Mapping Tool ("COBRA") to determine total changes in outdoor PM2.5 and stratospheric ozone concentrations.[11] NOx, SO2, VOC, and primary PM2.5 are all precursor emissions that contribute to ambient concentrations of PM2.5 and ozone. While NOx, SO2, and VOCs create adverse health effects on their own, the COBRA tool and therefore this analysis considers only their contributions to PM2.5 and ozone-related health effects.

The COBRA tool carries out the following method:

1. A user inputs changes in emissions in precursor pollutants NOx, SO2, VOCs, and primary PM2.5 by county into the tool.
2. COBRA's source-receptor matrix traces emissions of precursor pollutants from specific sources (e.g, residential natural gas combustion, highway diesel vehicles) in the source county to resulting concentrations of PM2.5 and ozone in receptor counties downwind.
3. COBRA multiplies the change in concentration of PM2.5 or ozone by a concentration-response function that relates changes in air pollutants with changes in specific health effects. For an illustrative example, a 1 microgram per meter cubed increase in PM2.5 concentrations may lead to a 10% increase in respiratory hospital admissions per person per year. COBRA calculates the change in a suite of health impacts associated with PM2.5 and ozone exposure separately. Table 1 provides the suite of health impacts included in this analysis.
4. COBRA multiplies the change in incidence of each type of health impact by the economic value of one occurrence of that health impact using values that the U.S. EPA

[11] CO-Benefits Risk Assessment Health Impacts Screening and Mapping Tool (COBRA). https://www.epa.gov/cobra

employs in its regulatory impact analysis. As noted previously, these economic values are provided as WTP or COI values.

5. COBRA sums the total costs to society from adverse health effects for PM2.5 and ozone to provide estimates of the total costs to society from adverse health effects associated with the original increase in source-specific emissions from Step 1, above.

As such, this analysis is conservative because it examines health impacts from one exposure pathway only, even though multiple exposure pathways are affected when gas use is increased. I monetize the negative impacts of increased concentrations of PM2.5 and ozone from residential natural gas combustion sources through WTP and COI metrics, consistent with the U.S. EPA's regulatory analysis methods.

Q: Identify important assumptions and parameters that underlay the analysis. For each assumption, why is it needed, and why is it reasonable?

A: The following assumptions underly this analysis:

- I assume residential natural gas customer expansion in New Mexico between 2025 and 2040 as consistent with the expansion explained in Ms. Vitulli's testimony. This assumption is reasonable as consistent with the best information available to us.
- I use the COBRA model to estimate changes in ambient or outdoor PM2.5 and ozone concentrations from natural gas residential fuel combustion emissions by county in New Mexico. Therefore, all assumptions and parameters that are employed in the COBRA model are employed in this analysis.
- COBRA's model relies on a source-receptor matrix developed by U.S. EPA in 2023, which reflects the relationship between emissions of air pollutants (including primary PM2.5, NOx, SO2, and VOCs, also known as precursor pollutants) and concentrations of

PM2.5 and ozone in receptor counties. For example, the model allows emissions of precursor pollutants from residential natural gas combustion in one county and tracks how those precursor pollutants move and contribute to ambient concentrations of the resulting pollutants of PM2.5 and ozone in a receptor county downwind. The source-receptor matrix, which is a reduced-form type of tool, compares well with full-form photochemical model predictions (e.g., r = 0.92 for modeling of the electric power sector). Full form photochemical models represent the "gold standard" for modeling projections of air pollution concentrations.[12]

- COBRA's model relies upon emissions data from EPA's Air Emissions Modeling Platform Version 6.2 to forecast ambient PM2.5 and ozone in COBRA.[13]
- As described in the method above, to estimate the health impacts associated with exposure to air pollutants PM2.5 and ozone, COBRA employs concentration-response functions from epidemiological literature linking pollutant concentrations with individual mortality and morbidity impacts. The health effects analyzed in COBRA are consistent with the suite of health effects that the U.S. EPA uses in their flagship Environmental Benefits Mapping and Analysis Program – Community Edition ("BenMAP-CE") tool as

[12] Baker, K.R., Simon, H., Henderson, B., Tucker, C., Cooley, D., & Zinsmeister, E. (2023). Source-Receptor Relationship Between Precursor Emissions and O3 and PM2.5 Air Pollution Impacts. Environmental Science and Technology, 57(39): 14626-14637.

[13] 2016v1 Emissions Modeling Platform, available here: https://www.epa.gov/airemissions-modeling/2016v1-platform

well as their regulatory analyses associated with air policies, shown in Table 1.[14,15,16]

Table 1. Health effects estimated in COBRA by air pollutant

Adverse Health Effect	**Pollutant**
Mortality	$PM_{2.5}$ + O_3
Nonfatal Heart Attacks	$PM_{2.5}$
Infant Mortality	$PM_{2.5}$
Hospital Admits, All Respiratory	$PM_{2.5}$ + O_3
ER Visits, Respiratory	$PM_{2.5}$ + O_3
Asthma Onset	$PM_{2.5}$ + O_3
Asthma Symptoms	$PM_{2.5}$ + O_3
ER Visits, Asthma	O_3
Lung Cancer Incidence	$PM_{2.5}$
Hospital Admits, Cardiovascular	$PM_{2.5}$
Hospital Admits, Alzheimer's	$PM_{2.5}$
Hospital Admits, Parkinsons	$PM_{2.5}$
Stroke Incidence	$PM_{2.5}$

[14] COBRA User Manual. 2025. https://www.epa.gov/system/files/documents/2025-03/cobra-user-manual-v5.2.pdf

[15] BenMAP-CE User's Manual. 2023. https://www.epa.gov/sites/default/files/2015-04/documents/benmap-ce_user_manual_march_2015.pdf

[16] Estimating PM2.5- and Ozone-attributable health benefits: 2024 Update. 2024. https://www.epa.gov/system/files/documents/2024-06/estimating-pm2.5-and-ozone-attributable-health-benefits-tsd-2024.pdf

Hay Fever/Rhinitis Incidence	$PM_{2.5}$ + O_3
Cardiac Arrest, Out of Hospital	$PM_{2.5}$
ER Visits, All Cardiac	$PM_{2.5}$
Minor Restricted Activity Days	$PM_{2.5}$
School Loss Days	O_3
Work Loss Days	$PM_{2.5}$

- To estimate the costs to society from adverse health effects, COBRA maintains consistency with the values that are used in BenMAP-CE, as well as in U.S. EPA's regulatory analyses. Economic valuation estimates include both WTP and COI estimates.[17]
- These assumptions are inherent within EPA's COBRA model, which was updated by U.S. EPA in March 2025.
- I allocate the location of projected NMGC new customers as emissions inputs into COBRA based on the current NMGC transmission and distribution allocation. I used the Natural Gas Service Territories shapefile, provided by Homeland Infrastructure Foundation-Level Data, to assess NMGC operation at the county level.[18,19] If more than

[17] COBRA User Manual. 2025. https://www.epa.gov/system/files/documents/2025-03/cobra-user-manual-v5.2.pdf

[18] Natural Gas Service Territories https://hifld-dhs-gii.gov/HIFLD

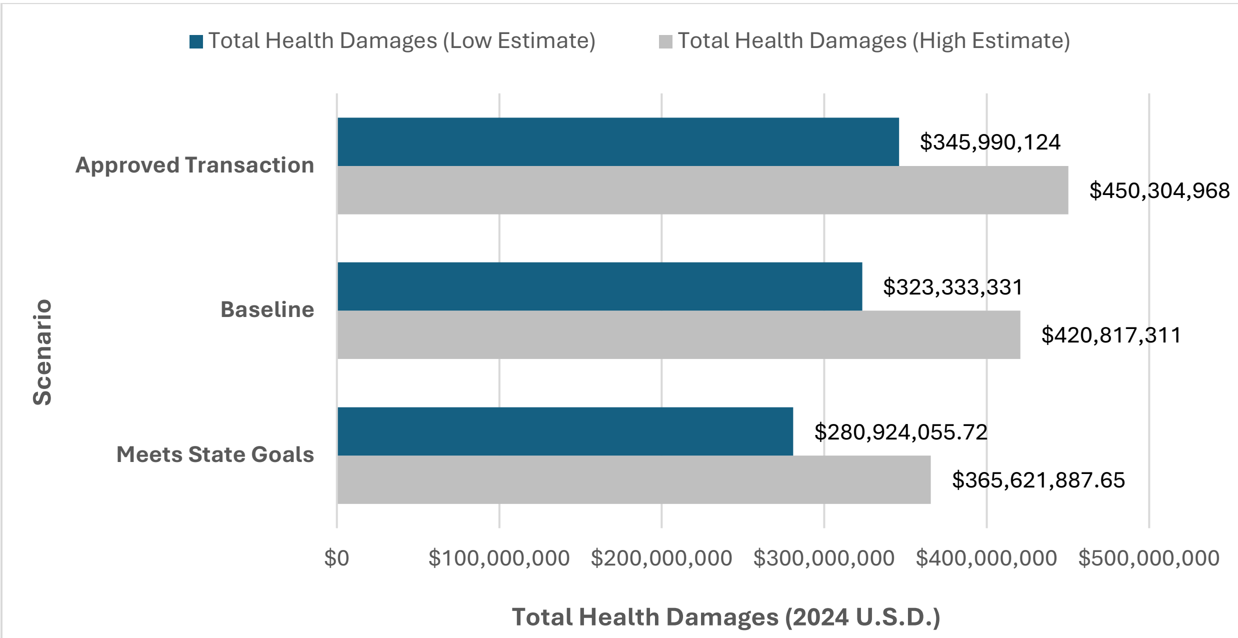
[19] CCAE requested shapefiles from the Joint Applicants on February 7, 2025 so I could incorporate the location of residential combustion sources of natural gas to assess the changes in air pollution concentrations and resulting costs associated with adverse health impacts from residential natural gas combustion. However, the Joint Applicants provided these details on March 27, 2025, which was too late to be able to meaningfully incorporate in my testimony.

1% of the county's land area is occupied by NMGC service territory, I indicated that NMGC was "present" in that county. For counties with an NMGC presence, I distributed the total number of NMGC customers based on the relative population in each county. For example, after removing counties in New Mexico that did not have an NMGC presence, Bernalillo County was home to 33.5% of the population of counties in which NMGC is present. Therefore, I assigned Bernalillo County 33.5% of the households in each year's analytic scenario.

Q: What are the conventional air pollutant-related costs to society from the adverse health effects from space heating under the different scenarios?

A: Figure 2 shows the conventional air pollutant-related costs to society from adverse health effects from space heating under the Baseline, Approved Transaction, and Meets State Goals scenarios. These results estimate the total costs to society from the adverse health effects of increased natural gas combustion for residential use from 2025 through 2040, using a 2% discount rate for future years (in 2024 dollars). I present high and low costs to society from the adverse health effects consistent with COBRA's results, which represent important uncertainties in the estimates of air quality related health effects. The high and low estimates are not 95% and 5% confidence intervals; rather, the high-end estimate represents results based on the epidemiological concentration-response function from Pope et al. (2019), while the low-end estimate represents results based on the epidemiological concentration-response function from Wu et al. (2020). The U.S. EPA does not recommend averaging these values, as the study design for each of these studies differs significantly, which is consistent with accepted best practices.[20,21]

Figure 2. Total costs to society from the adverse health effects by Scenario, 2025 through 2040



The approved transaction leads to the largest total costs to society from the adverse health effects when compared to the baseline or meets state goals scenarios, creating $346 million in health damages at the low end and $450 million in costs to society from the adverse health effects at the high end over the 16-year period.

Figure 3a provides low-end discounted estimates of costs to society from the adverse health effects by scenario between 2025 and 2040; Figure 3b provides high-end discounted estimates of costs to society from the adverse health effects by scenario between 2025 and 2040.

[20] Wu, X., D, Braun, J. Schwartz, M.A. Kioumourtzoglou, and F. Dominici. 2020. Evaluating the impact of long-term exposure to fine particulate matter on mortality among the elderly. Science Advances 6: eaba5692

[21] Pope, C.A., J.S. Lefler, M. Ezzati, J.D. Higbee, J.D. Marshall, S. Kim, M. Bechele, K.D. Gilliat, S.E. Vernon, A.L. Robinson, and R.T. Burnett. 2019. Mortality Risk and Fine Particulate Air Pollution in a Large, Representative Cohort of U.S. Adults. Environmental Health Perspectives 127(7): 077077.

Figure 3a. Discounted low-end costs to society from the adverse health effects from air pollution from residential natural gas combustion, 2025 - 2040

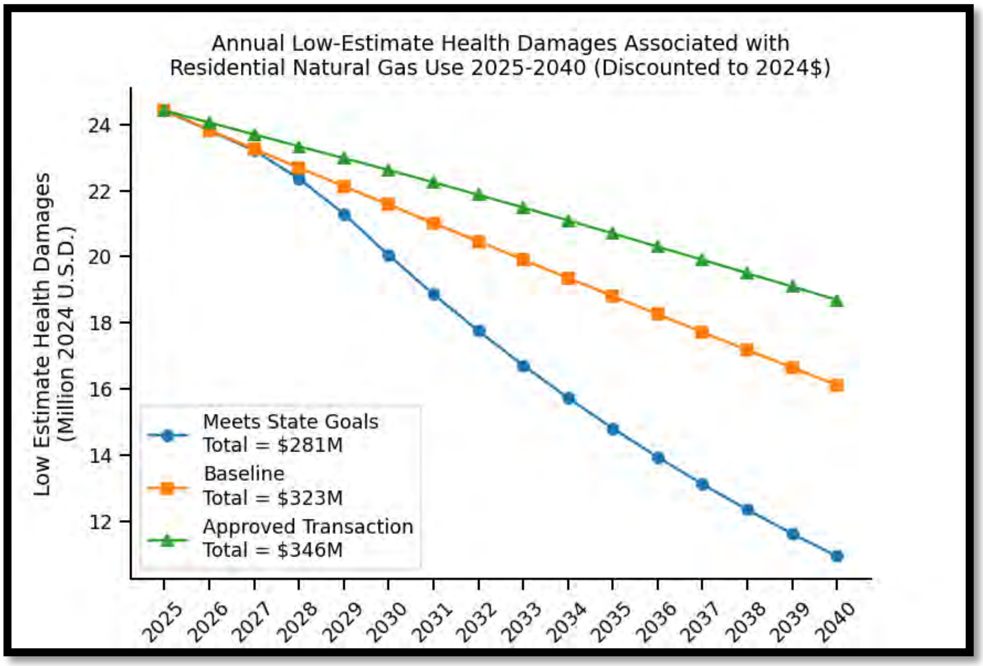


Figure 3b. Discounted high-end costs to society from the adverse health effects from air pollution from residential natural gas combustion, 2025 - 2040

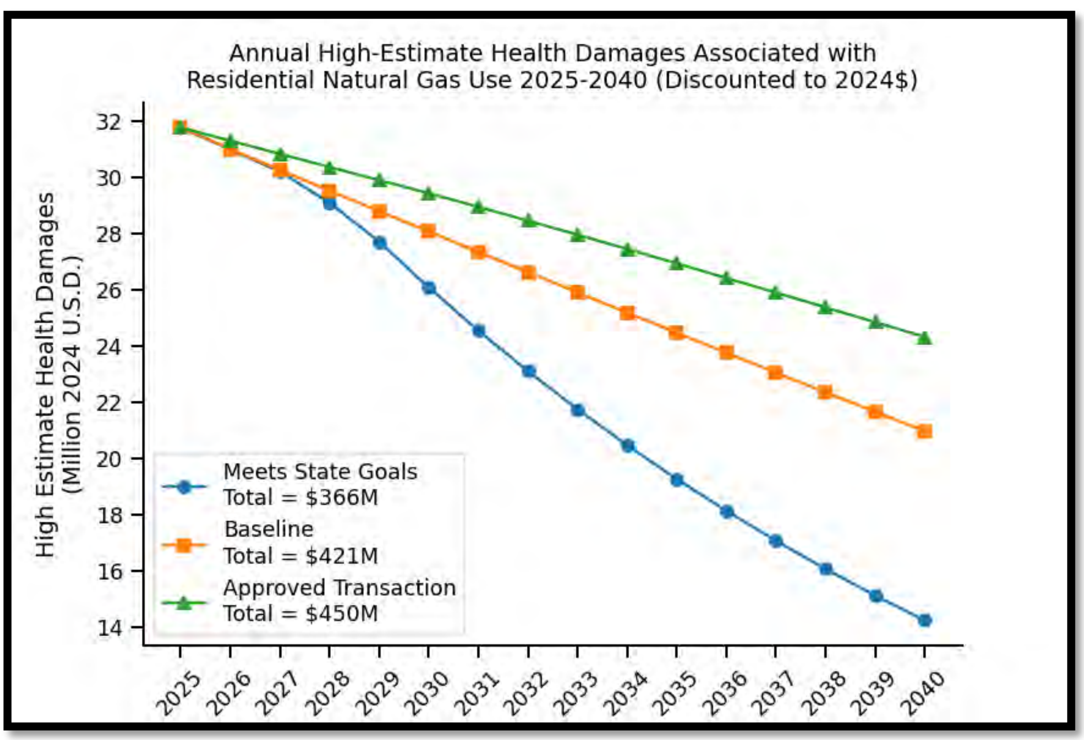


Figure 4a provides undiscounted low-end estimates of costs to society from the adverse health effects from air pollution from residential natural gas combustion; Figure 4b provides undiscounted high-end estimates of costs to society from the adverse health effects from air pollution from residential natural gas combustion.

Figure 4a. Undiscounted low-end costs to society from the adverse health effects from air pollution from residential natural gas combustion, 2025 - 2040

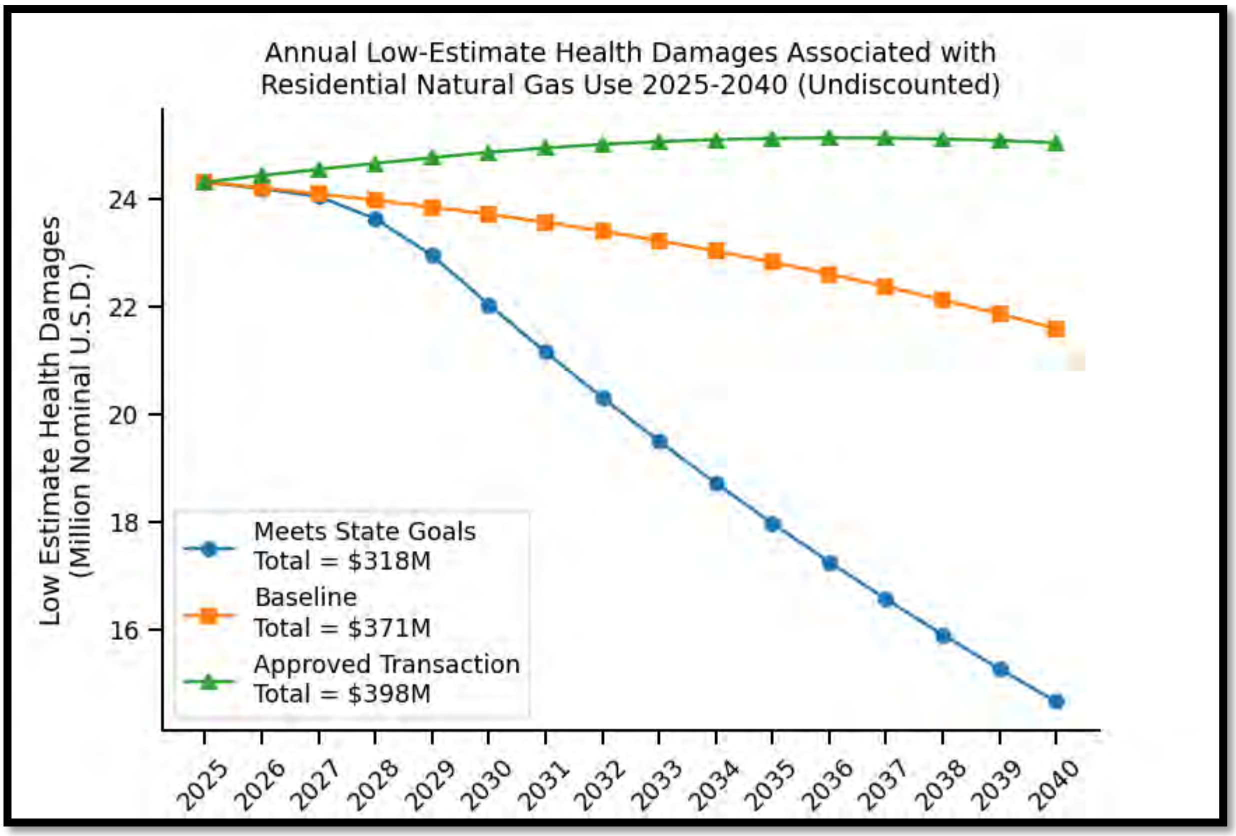
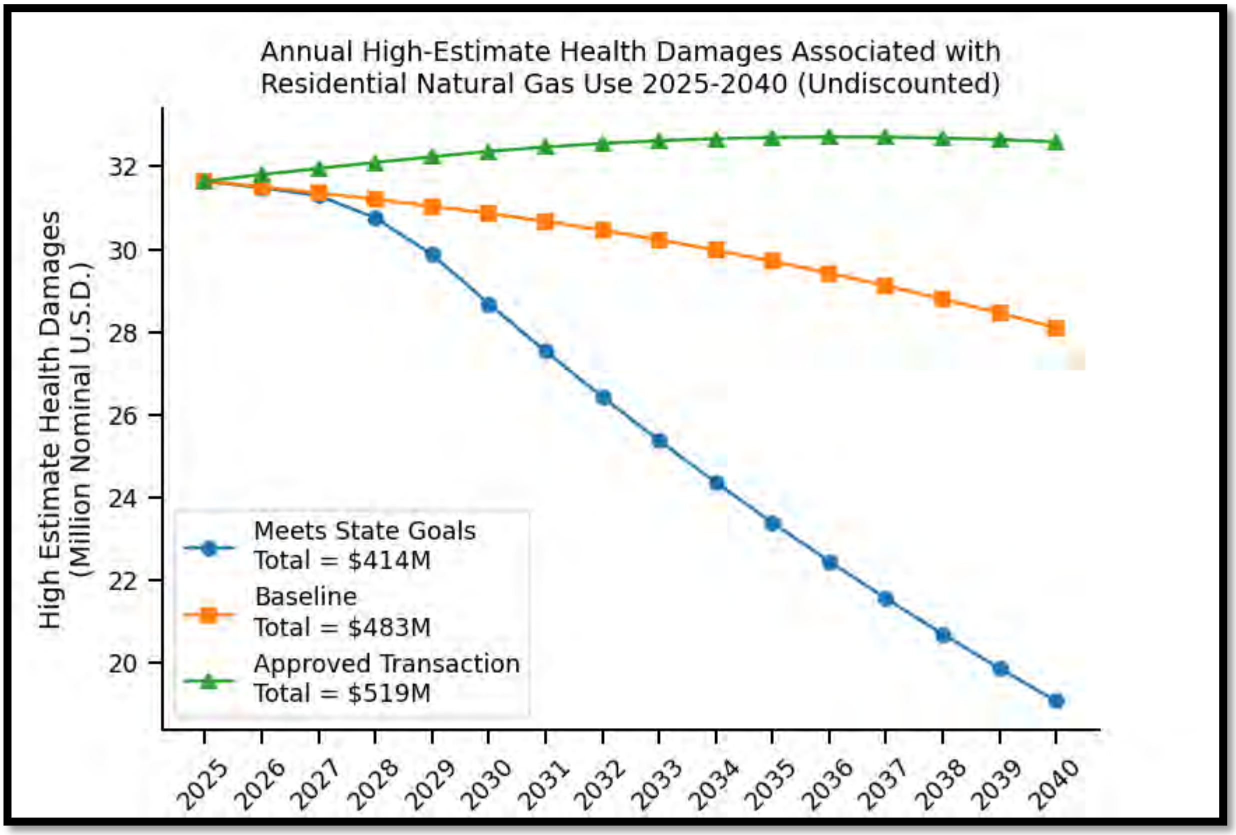


Figure 4b. Undiscounted high-end costs to society from the adverse health effects from air pollution from residential natural gas combustion, 2025 - 2040



Consistent with the greenhouse gas analysis, the approved transaction scenario has the highest costs to society from the adverse health effects. In contrast, the scenario where NMGC meets State climate goals, has the lowest costs to society from the adverse health effects associated with air pollution.

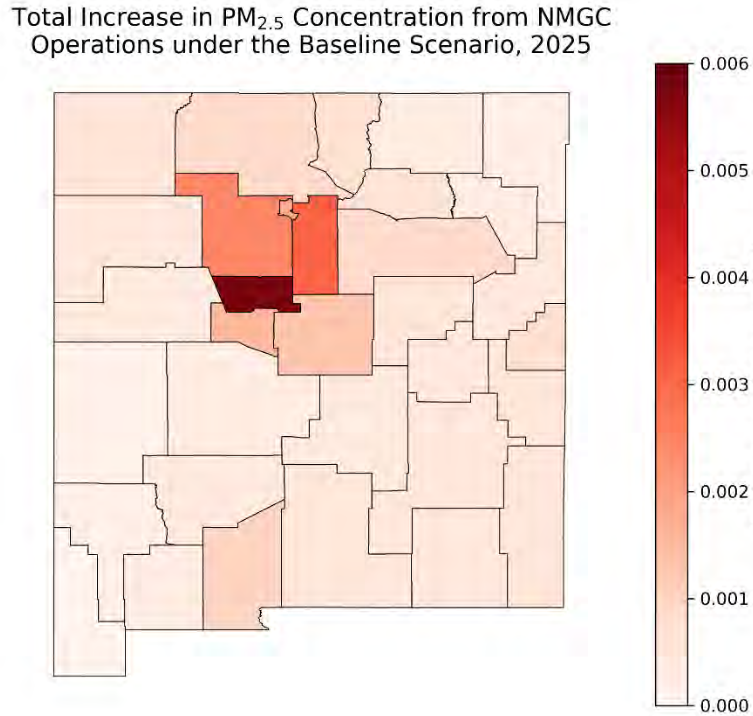
Q: How are different communities (those that are marginalized or otherwise overburdened) impacted by conventional air pollutant related health impacts?

A: In New Mexico, a community is identified as underserved if "the median adjusted gross income…does not exceed two hundred percent of the federal poverty level," or areas where there is a "high energy burden or limited access to energy efficiency services as determined by department rule” (N.M. Stat. § 62-17A-2(J)). To calculate the federal poverty level for each county, I adjusted the federal poverty level to match the median household size for each county. I assumed all people within each county experience equivalent air pollution exposures (and therefore equivalent health effects associated with those exposures). I used 2023 American Community Survey 5-Year Estimates data for median income, household size, and population statistics and 2023 federal poverty levels from the U.S. Department of Health and Human Services.

Based on median income alone, twelve of New Mexico’s 33 counties, including Sierra, Luna, Guadalupe, De Baca, Harding, McKinley, Union, Grant, Torrance, Socorro, Hidalgo, and Cibola counties, are underserved.

The COBRA model presents results at the county level, indicating the changes in pollutant concentrations uniformly within each county. Figure 5 provides modeled PM2.5 concentrations associated with the changes in residential natural gas emissions and Figure 6 provides modeled ozone concentrations associated with the changes in residential natural gas emissions.

Figure 5a. Modeled 2025 PM2.5 concentrations by county



PM2.5 concentrations in 2025 are the same across scenarios.

Figure 5b. Modeled 2040 PM2.5 concentrations for baseline scenario by county

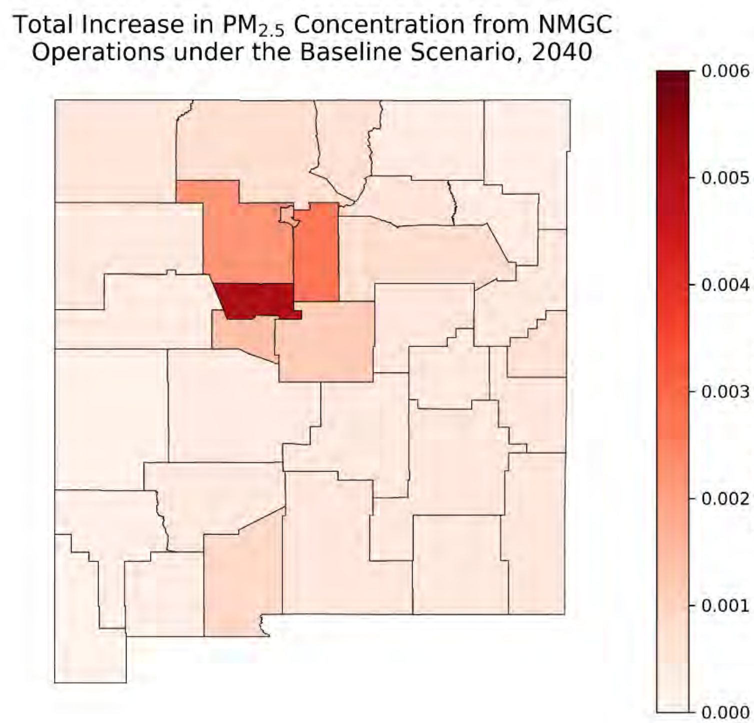


Figure 5c. Modeled 2040 PM2.5 concentrations for meets state goals scenario by county

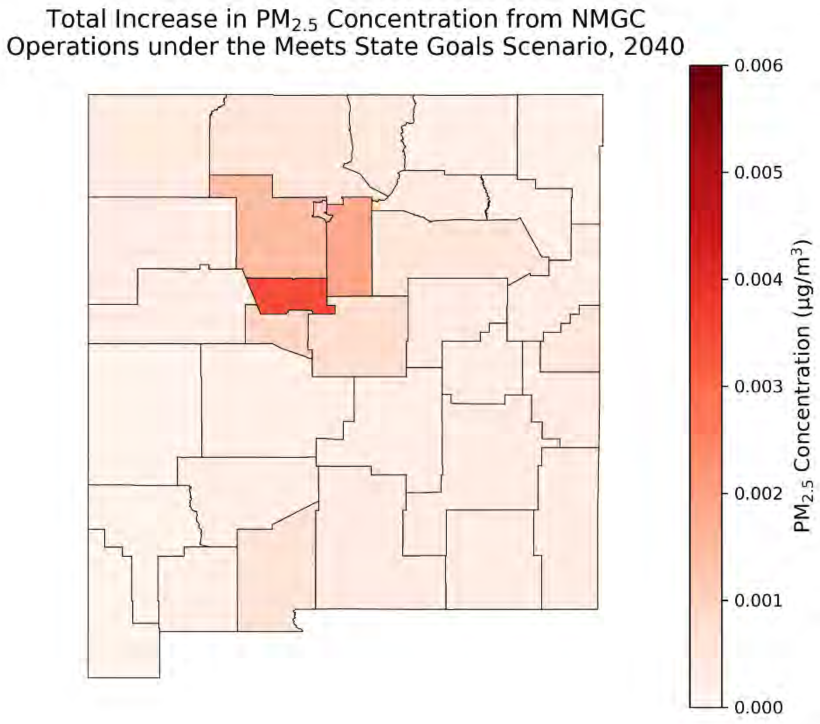


Figure 5d. Modeled 2040 PM2.5 concentrations for purchase scenario by county

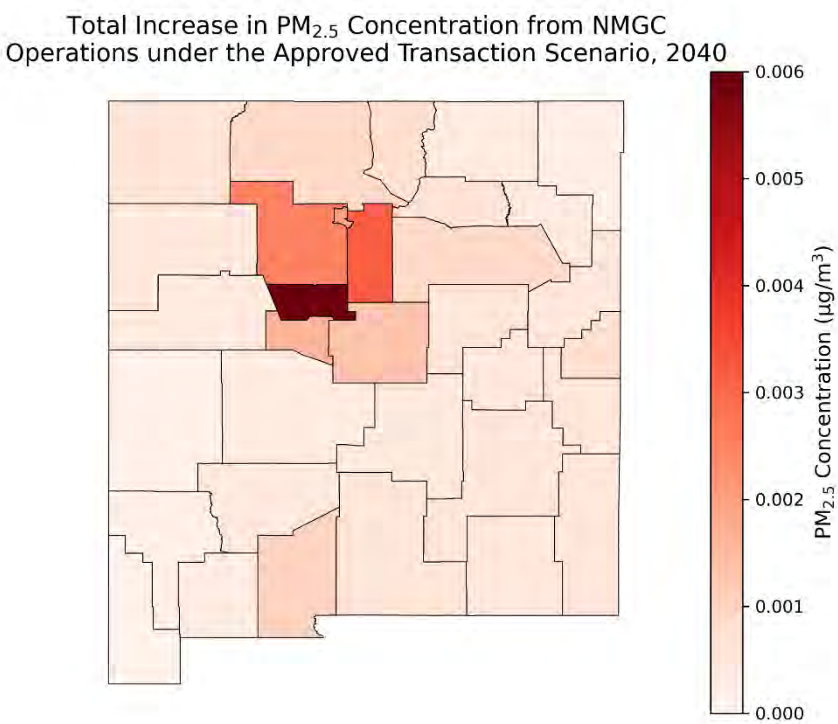
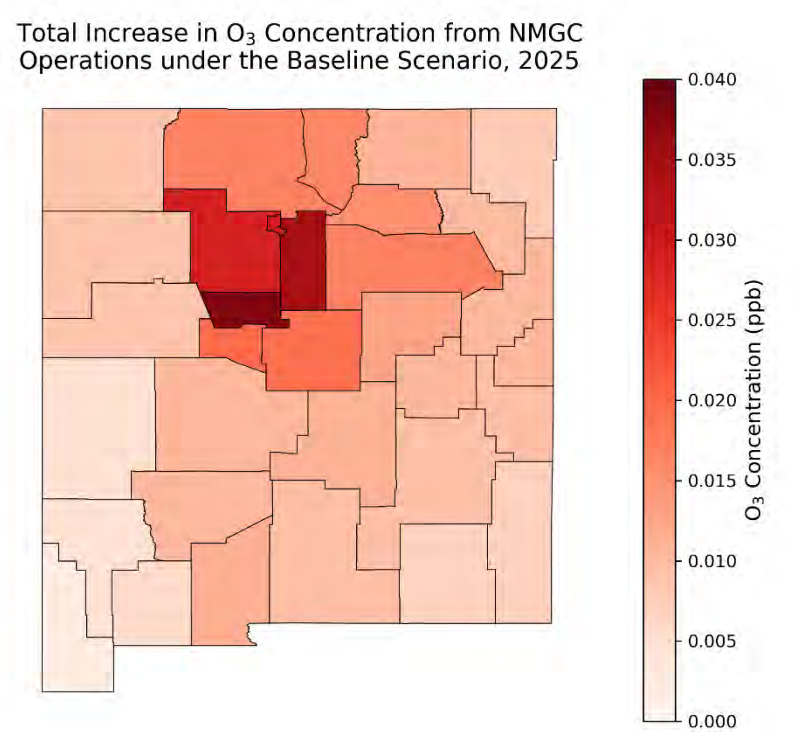


Figure 5a shows the modeled PM2.5 concentrations representative across all scenarios for 2025, while Figures 5b, 5c, and 5d show modeled PM2.5 concentrations in 2040 for the baseline, meets state goals, and purchase scenarios, respectively. PM2.5 concentrations are highest in the center of the state, in and surrounding Bernalillo county (where Albuquerque and Rio Bravo are located), where most of NMGC's service territory resides.[22] Although NMGC service territory includes Hidalgo, Grant, Luna, Sierra, Doña Ana, Otero, Eddy, Chaves, and Lea counties in the southern part of the state, ambient concentrations related to the increased emissions from natural gas combustion likely accrue downwind, in western Texas.

Figure 6 provides modeled concentrations of ozone by scenario.

Figure 6a. Modeled 2025 ozone concentrations by county



Ambient ozone concentrations from natural gas residential combustion in 2025 remain the same

[22] NMGC Service Territory. https://www.nmgco.com/userfiles/images/Service%20Territory.JPG

across scenarios.

Figure 6b. Modeled 2040 ozone concentrations for baseline scenario by county

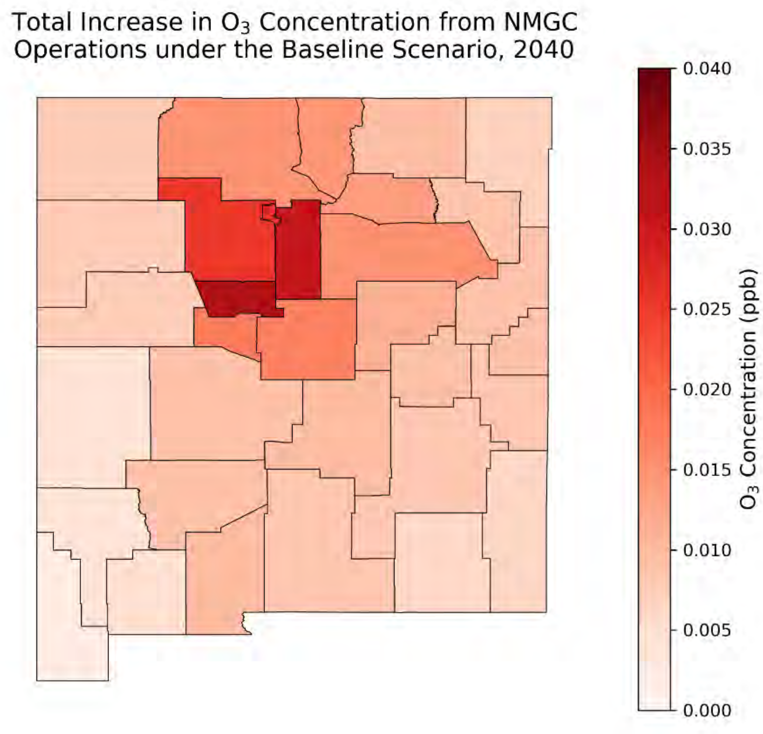


Figure 6c. Modeled 2040 ozone concentrations for meets state goals scenario by county

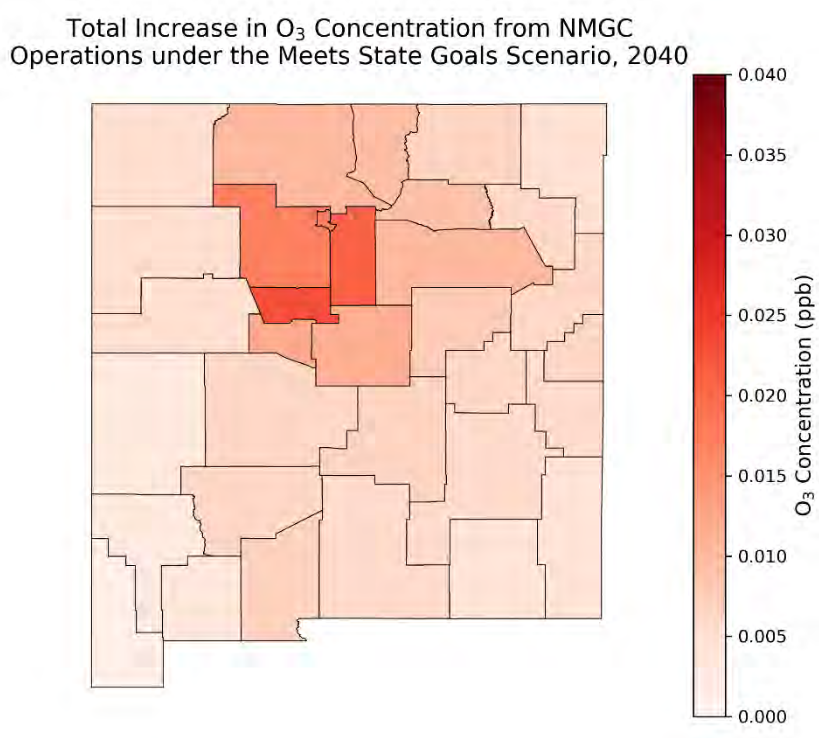
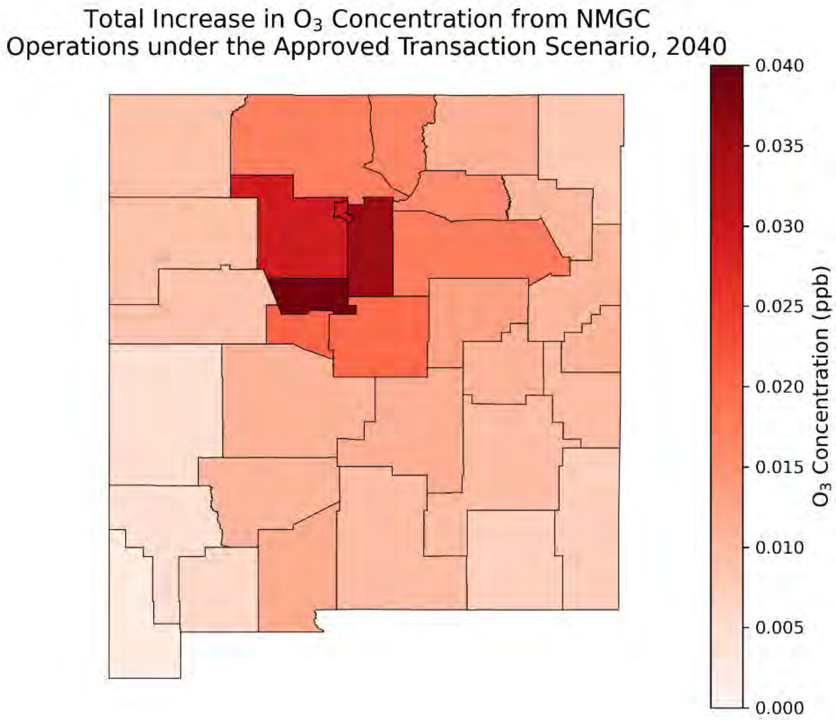


Figure 6d. Modeled 2040 ozone concentrations for purchase scenario by county



The ambient ozone concentrations in 2040 associated with residential natural gas combustion from the purchase scenario (Figure 6d) are significantly higher than those associated with the meets state goals (Figure 6c) and baseline scenarios (Figure 6b).

Unfortunately, I was not able to assess the direct impacts from the purchase of NMGC by BCP on underserved communities, as the NMGC service area includes only a small fraction of some of the designated underserved counties. Further, because much of New Mexico is a relatively sparsely populated state and changes in air pollutants are available only at the county level via the COBRA model, the analysis is unable to discern specific impacts to disadvantaged or low-income communities or households. However, it is important to note that increased concentrations of PM2.5 and ozone in underserved communities will lead to greater hardship than in other communities, as those in underserved areas are likely to have less access to high quality healthcare, the types of jobs that allow for time away or loss of productivity, or sufficient savings to cover long-term economic hardship from medical expenses.

IV. DATA CENTER AIR POLLUTANT EMISSIONS AND HEALTH IMPACTS ANALYSIS

Q: Why is there reason to believe that data centers that rely on natural gas, either through on-site generation or through fueling electricity generating units, will be more likely to be sited in New Mexico if the PRC approves this transaction?

A: My colleague Angela Vitulli addresses this question in her testimony.

Q: Describe the analysis that Industrial Economics conducted into the likely conventional air pollutant related health impacts of data center expansion in New Mexico.

A. Because the exact future of data center expansion in New Mexico is unspecified and uncertain at this time, I have constructed three scenarios that are plausible. Table 2 shows the parameters associated with each data center type.

Table 2. Data center scenario parameters

Scenario 1: City-Based (gridded natural gas)	Scenario 2: Site-Based (gridded natural gas)	Scenario 3: Site-Based (non-gridded natural gas)
5 MW capacity Located within more densely developed area – likely single building Connected to grid (assume electricity consumed = 34% NG) Assumes operation at 82.5% capacity (8,751 hours/year)	100 MW capacity Located in less dense area – could be within larger data center "campus" Connected to grid (assume electricity consumed = 34% NG) Assumes operation at 82.5% capacity (8,751 hours/year)	100 MW capacity Located in less dense area – could be within larger data center "campus" **Not** connected to grid - on-site power generation (assume electricity consumed = 100% NG) Assumes operation at 82.5% capacity (8,751 hours/year)

Q: Describe the different data center-related scenarios.

A: For Scenario 1, a data center that is based in a city and has a smaller footprint, I assume a capacity of 5 MW. I assume that the data center is connected to the electricity grid, where natural gas combustion supplies 34% of the electricity consumed in the grid. I assume the data center operates at 82.5% capacity, or 8,751 hours per year.

For Scenario 2, a data center that is based in a less dense area and therefore may have a larger footprint, I assume a capacity of 100 MW. I assume that the data center is connected to the electricity grid, where natural gas combustion supplies 34% of the electricity consumed in the grid. I assume the data center operates at 82.5% capacity or 8,751 hours per year.

For Scenario 3, a data center that is based in a less dense area and therefore may have a larger footprint, I assume a capacity of 100 MW. I assume that the data center is not connected to the electricity grid and is instead served by on-site natural gas via a non-gridded system. I assume the electricity consumed is 100% natural gas, and assume the center operates at 82.5% capacity, or 8,751 hours per year.

Q: Describe the logic employed by the analysis and the data sources.

A: For the analysis of data center natural gas combustion-related costs to society from adverse health effects associated with the three data center scenarios, I employ emissions factors from the U.S. EPA's AP-42 that relate the amount of pollutants emitted from specific activities to calculate the quantity of NOx, SO2, VOCs, and primary PM2.5 emissions from residential heating for all NMGC households by year.[23] Next, I use U.S. EPA's CO-Benefits Risk

[23] Eastern Research Group, "Emission Factor Documentation for AP-42 Section 1.4 Natural Gas Combustion," U.S. Environmental Protection Agency Office of Air Quality Planning and Standards, 1998. https://www.epa.gov/sites/default/files/2020-09/documents/background_document_ap-

Assessment Health Impacts Screening and Mapping Tool ("COBRA") to determine total changes in outdoor PM2.5 and stratospheric ozone concentrations.[24] NOx, SO2, VOCs, and primary PM2.5 are all precursor emissions that contribute to ambient concentrations of PM2.5 and ozone. While NOx, SO2, and VOCs create adverse health effects on their own, the COBRA tool and therefore this analysis considers only their contributions to PM2.5 and ozone-related health effects. I explained the operation of the COBRA tool earlier in my testimony (see page 11). I monetize the negative impacts of increased concentrations of PM2.5 and ozone to supply the electricity grid with additional combusted natural gas (for Scenarios 1 and 2) and to supply a large datacenter with combusted natural gas for energy (Scenario 3) through WTP and COI metrics, consistent with the U.S. EPA's regulatory analysis methods.

Q: Identify important assumptions that underlay the analysis. For each assumption, why is it needed, and why is it reasonable?

A: The following assumptions underlie this analysis:

- I assume that the BCP's purchase of NMGC will include supplying natural gas to a yet-to-be-built data center in NMGC's service territory in New Mexico. I assume the data centers will adhere to one of the three scenarios described above.
- I use the COBRA model to estimate changes in ambient or outdoor PM2.5 and ozone concentrations from natural gas combustion in service to the electricity grid emissions in New Mexico for Scenarios 1 and 2; I use the COBRA model to estimate changes in ambient or outdoor PM2.5 and ozone concentrations from on-site non-gridded natural gas

42_section_1.4_natural_gas_combustion.pdf.

[24] CO-Benefits Risk Assessment Health Impacts Screening and Mapping Tool (COBRA). https://www.epa.gov/cobra

combustion in New Mexico for Scenario 3. Because I do not know where the data centers will be located, I do not assign the emission to a specific county. Instead, I apply data center-related emissions to the state of New Mexico as a whole. All assumptions and parameters that are employed in the COBRA model are employed in this analysis.

- COBRA's model relies upon emissions data from EPA's Air Emissions Modeling Platform Version 6.2 to forecast ambient PM2.5 and ozone in COBRA.[25]
- As described previously, to estimate the health impacts associated with exposure to air pollutants PM2.5 and ozone, COBRA employs concentration-response functions from epidemiological literature linking pollutant concentrations with individual mortality and morbidity impacts. The health effects analyzed in COBRA are consistent with the suite of health effects that the U.S. EPA uses in their flagship BenMAP-CE tool as well as their regulatory analyses associated with air policies, shown in Table 1.[26,27,28]
- To estimate the costs to society from adverse health effects, COBRA maintains consistency with the values that are used in BenMAP-CE, as well as in U.S. EPA's regulatory analyses. Economic valuation estimates include both WTP and COI estimates.[29]
- These assumptions are inherent within EPA's COBRA model, which was updated by

[25] 2016v1 Emissions Modeling Platform, available here: https://www.epa.gov/airemissions-modeling/2016v1-platform
[26] COBRA User Manual. 2025. https://www.epa.gov/system/files/documents/2025-03/cobra-user-manual-v5.2.pdf
[27] BenMAP-CE User's Manual. 2023. https://www.epa.gov/sites/default/files/2015-04/documents/benmap-ce_user_manual_march_2015.pdf
[28] Estimating PM2.5- and Ozone-attributable health benefits: 2024 Update. 2024. https://www.epa.gov/system/files/documents/2024-06/estimating-pm2.5-and-ozone-attributable-health-benefits-tsd-2024.pdf
[29] COBRA User Manual. 2025. https://www.epa.gov/system/files/documents/2025-03/cobra-user-manual-v5.2.pdf

U.S. EPA in March 2025.

Q: What are the conventional air pollutant related impacts estimated from additional data centers?

A: Table 3 provides the annual costs from the costs to society from adverse health effects from exposure to criteria pollutants generated by natural gas combustion emissions associated with each hypothetical data center scenario (2% discounting in 2024$).

Table 3. Annual costs by data center scenario[30]

Data Center Scenario	**Total Annual Costs – Low (2024 $)**		**Total Annual Costs - High (2024 $)**	
	2024	*2040*	*2024*	*2040*
Scenario 1: City-Based (gridded natural gas)	$350	$255	$762	$555
Scenario 2: Site-Based (gridded natural gas)	$7,009	$5,105	$14,813	$10,791
Scenario 3: Site-Based (non-gridded natural gas)	$714,620	$520,562	$808,428	$588,896

The impact that data centers will have on costs to society from adverse health effects differ by size of data center and by whether the data center is supplied by the electricity grid or by non-gridded natural gas. Large data centers require more energy, thus requiring more natural gas combustion, leading to larger costs to society from adverse health effects. Data centers that use non-gridded natural gas on site use energy that is supplied entirely by natural gas (rather than the

[30] Exhibit SP-3, JA Response to CCAE 1-1

grid, which uses 34% natural gas), therefore creating larger costs to society from adverse health effects.

V. CONCLUSION

Q: Does this conclude your testimony?

A: Yes.

IEc

STEFANI PENN, PhD PRINCIPAL

Stefani Penn, PhD (she/her) has a strong background in exposure assessment and methods development for environmental health, energy, equity, and policy applications. Stefani has served as a consultant to a broad range of clients, including the U.S. Environmental Protection Agency (EPA), Federal Energy Regulatory Commission, New York State Energy Research and Development Agency (NYSERDA), the South Coast Air Quality Management District, UN Environment Programme, and others. Stefani's work has spanned the topics of energy equity, where she has worked to identify barriers to clean energy in certain jurisdictions and created methods to understand the distribution of non-energy benefits; communications and environmental justice, where she has facilitated meetings, training programs, and discussions to improve environmental literacy; air quality management, where she has worked alongside local government, academic, and non-government colleagues to create air quality management, monitoring, and analysis plans worldwide; and methods development and benefits assessment, where Stefani has brought together information across disciplines to build new methods to understand how decisions and policy actions impact society. Her work across these areas overlap and build upon one another, with a keen focus on building meaningful relationships with project partners, solving complex and challenging problems, and using the best available science and evidence to support policy actions. Stefani has led and created curricula for more than 30 air quality, environmental justice, risk communication, and community engagement workshops internationally and communicated findings of her work to academic, private, and government audiences.

Education

Doctor of Philosophy in Environmental Health, Boston University School of Public Health
Master of Science in Exposure Assessment, University of Washington School of Public Health
Bachelor of Science in Chemistry, Carnegie Mellon University Mellon College of Science

Project Experience

Energy Equity

For the FEDERAL ENERGY REGULATORY COMMISSION (FERC), directed work to identify, review, and analyze guidance to incorporate health impact assessment into the Commission's National Environmental Policy Act (NEPA) process for energy infrastructure permit evaluations. Built upon FERC's Equity Action Plan to create thoughtful and evidence-based recommendations to ensure FERC is able to consider the air quality, health, and environmental justice implications of the energy infrastructure projects within their jurisdiction. Created methods to operationalize FERC's ability to consider the health impacts that would be caused by new energy infrastructure in communities with already high baseline burden of adverse health effects.

For the BUREAU OF OCEAN ENERGY MANAGEMENT (BOEM), created a suite of interconnected materials to examine the exposure pathways between offshore energy generation, maintenance, and decommissioning and the public health of communities near ports. Stefani created fact sheets linking offshore energy development with health impacts related to air quality, noise, land disturbances, space use conflicts, and altered socioeconomic conditions based on a thorough review of literature and informed discussions with subject matter experts.

For NYSERDA, provided review and analysis of secondary data to support understanding of the barriers and opportunities within disadvantaged communities to accessing distributed renewable energy generation, energy efficiency and weatherization investments, zero-emissions and low-emissions transportation options, adaptation measures to improve the resilience of homes and local infrastructure to the impacts of climate change, and other services and infrastructure that can reduce the risks associated with climate-related hazards.

For COMED, an Exelon company serving Northern Illinois, Stefani served as project manager for IEc. IEc's role was to develop a company-wide strategy for approaching energy equity to comply with regulatory requirements under two new Illinois laws (collectively referred to as CEJA) that mandate realignment of utility investments to advance equity. The work identifies the challenges that populations in disadvantaged and underserved communities face in accessing ComEd clean energy programs and, in some cases, maintaining access to power. The project team produced this report, which ComEd shared broadly.

For NYSERDA, created a framework to understand benefits associated with clean energy and energy efficiency policies across agencies within New York State. Stefani has worked within the parameters defined by New York's Climate Leadership and Community Protection Act (CLCPA) to quantify benefits that accrue within disadvantaged communities. Benefits include those related to both indoor and outdoor air quality, job creation and training, energy and fuel savings, and direct spending.

For EVERSOURCE, reviews materials in support of energy efficiency program evaluation, including comprehensive methodological review of work plans, evaluation designs, survey research plans, interim deliverables and final reports for non-energy impacts. IEc provides feedback and recommendations to Eversource's evaluation contractors to improve the technical quality of evaluation design as well as the communication of results.

For Southern California Gas Company, Stefani is directing a report to understand the non-energy benefits of equity-focused energy efficiency and clean energy programming across California. Stefani is working to create methods to understand non-energy benefits of more than fifty programs, with aim to quantify the distribution of effects across region, utility, and based on differences in income.

Communications and Environmental Justice

For the U.S. EPA OFFICE OF ENVIRONMENTAL JUSTICE AND EXTERNAL CIVIL RIGHTS, provided research, report editing, technical analysis, and logistical support to the White House Environmental Justice Advisory Council (WHEJAC) and the National Environmental Justice Advisory Council (NEJAC). Stefani has supported both councils in making recommendations to the federal government and executive leadership regarding climate planning, preparedness, response, recovery, and impacts; advancements to the Climate & Economic Justice Screening Tool (CEJST); updates to the National Ambient Air Quality Standards (NAAQS) to address disparate pollution exposures; and analysis of cumulative impacts on overburdened communities. Stefani facilitated a series of meetings of the Cumulative Impacts Analysis workgroup to ensure workgroup members were able to contribute to recommendations in a way that prioritized respect and collaboration.

For the U.S. EPA Office of Land and Emergency Management (OLEM), provided technical, analytical, and logistical support to deliver an updated process for approaching environmental justice, equity, and consideration of climate change in OLEM policy and regulatory actions. This work incorporates perspectives from a team of experts to weigh in on community engagement and outreach methods that may be most impactful, strengthening recommendations. Stefani's analytical methods and recommendations address emerging literature and strategy to ensure effective community engagement, account for existing structural barriers, and consider equity weighting and other measures for measuring disparity across groups impacted by OLEM's actions.

For the U.S. EPA Office of Environmental Justice and External Civil Rights, managed and incorporated the voices of a team of experts and providing technical analyses in support of advancing the utility of EPA's EJSCREEN tool. Team expertise includes knowledge of rural and tribal concerns, geospatial analyses, social justice measures, cumulative risk assessment, and historical environmental justice evaluation. Stefani led quantitative and qualitative analyses performed by the IEc and expert teams, wrote the executive summary document, and edited all analyses.

For U.S. EPA Office of Air and Radiation, created a risk communication and community engagement training program to enhance staff capacity to engage and communicate effectively with partners, decision makers, and the public regarding air toxics-related health and environmental risk. Due to the Covid-19 pandemic, Stefani has led these trainings virtually and shared relevant training materials for posterity.

For the U.S. EPA Smart Sectors Program, created websites to communicate case studies focused on private industry efforts in building engagement with communities and advancing environmental justice through voluntary means. Case studies included decision making efforts across Dominion Energy, GE, Microsoft, and other organizations, focusing on community engagement, brownfields redevelopment, renewable energy credits and power purchase agreements, and energy equity. Stefani also created an issue brief to describe the overlap and differences between climate, environmental, and energy equity, digging into the places where efforts to advance one area creates disadvantage in another.

For the U.S. EPA Office of Policy (National Center for Environmental Economics), created a series of materials in support of NCEE's environmental justice analysis efforts. Stefani created a workshop and brought together a series of experts focused on environmental justice concerns of ubiquitous chemicals (like PFAS, phthalates, and chemical mixtures in the indoor environment), including the unique risks they pose to socially vulnerable populations and challenges in understanding differential exposures. (2022)

For the U.S. EPA Office of Policy (National Center for Environmental Economics), Stefani has reviewed, edited, and revised the Agency's 2016 Technical Guidance for Assessing Environmental Justice in Regulatory Analysis to create an updated version (2024 edition) that has been reviewed by the Science Advisory Board. Stefani was a technical and editorial contributor to U.S. EPA's 2024 Environmental Justice Technical Guidance. Stefani has created training materials to disseminate the information in the new EJTG including presentation materials and case study examples, reviewing public comments to incorporate into the guidance's final version. (2022-current)

For the Environmental Defense Fund, conducted an analysis of the potential environmental justice benefits stemming from more stringent National Ambient Air Quality Standards for fine particulate matter (PM2.5). Replicated EPA results published in their Draft Policy Assessment and supplemented their analyses using data sources (e.g., air quality, incidence) stratified at finer spatial resolutions. Co-authored public facing report. (2021-2022)

Air Quality Management

For the U.S. EPA OFFICE OF AIR QUALITY PLANNING AND STANDARDS, created the suite of materials on EPA's public facing Megacities website, including templates that provide instructions that could be used by any organization aiming to advance air quality management planning and related public health in cities with air pollution challenges worldwide; presentations that provide capacity building for interested parties (ranging from air quality basics to ambient monitoring and air quality modeling, emissions inventory development, data management and validation, source apportionment, benefit cost analyses, and air quality management plan development); and videos that highlight and explain how these tools can be used. Stefani had a lead management role in each of the partnerships outlined on the website. (2019-2023)

For U.S. EPA OFFICE OF AIR AND RADIATION, provides technical, analytical, and logistical support for air quality management planning and policy analysis in Accra, Ghana, Santiago, Chile, Addis Ababa, Ethiopia, and Lima, Peru as part of EPA's Megacities Partnership initiatives. Work involves analyzing air quality measures in these developing megacities and collaboration with local policy makers to identify air quality priorities for air pollution control. Stefani has led workshops to build local capacity for emissions inventory development, air quality modeling and the estimation of benefits and costs of air pollution policies via monitored air quality data, using tools such as EPA's Positive Matrix Factorization (PMF) tool and BenMAP-CE. Using both satellite-based estimates and ground-based measurements of fine particulate matter to estimate the burden of air pollution, Stefani has led the development of air quality management plans for Accra and for Addis Ababa that can serve as models for other African nations and developed retrospective benefit cost and critical air quality episode analyses for Santiago air quality measures.

For the WORLD BANK GROUP, supported EPA Ghana in air quality monitor data development and provided targeted training and other support to enhance EPA Ghana's overall capacity to provide air quality information services. Stefani was the project manager, managing our team of academic, private sector, and local collaborators to assist EPA Ghana in developing a new AQ data stream to characterize PM2.5 concentrations and to conduct the necessary laboratory and statistical work to identify source contributions. Stefani built a relationship with colleagues at EPA Ghana, University of Ghana, and local community-based organization Environment 360 and continues to collaborate with these partners for air quality focused efforts today. Further, EPA Ghana has been able to continue this work after the conclusion of IEc's contract and serve as a regional leader in the area of air quality measurement and management. (2019-2022)

For C40 CITIES, worked with colleagues at the Addis Ababa Environmental Protection and Green Development Commission to create an air quality measurement strategy in support of the air quality management plan we had collaborated on through the USEPA Megacities partnership. Stefani designed and developed targeted capacity building workshops and seminars for city government staff in air quality measurement and data management, coordinating with local experts at Addis Ababa University and Kotebe Metropolitan University. Using video conferencing and on-site video production, worked with Addis Ababa-based partners to aid in the installation of a regulatory grade continuous PM2.5 monitor on the AAEPGDC campus. (2019-2021)

For the UNITED NATIONS ENVIRONMENT PROGRAMME, worked with local decision makers to create a 3-part curricula to support an air quality management-based community of practice in Southern Africa. Curricula included policy recommendations, mitigation strategies, and the business case to support these efforts; use of novel technologies to advance air quality measurement, including ground-based measurement devices and satellite-based measures; and methods for communicating about air quality management with citizens.

Benefits Assessment and Methods Development

For the SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT, analyzed 2022 Air Quality Management Plan to understand environmental justice impacts of new air pollution mitigation policies based on methods developed for 2016 analysis. Led the development of a series of EJ definitions to compare against SCAQMD's disadvantaged communities definition, analyzed air quality-related health impacts across communities, and applied inequality metrics to understand changes in inequality both between and within disadvantaged communities associated with new pollution mitigation measures. Produced the Socioeconomic Report for the 2022 AQMP.

For the SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT, leveraged state and federal tools (including CalEnviroScreen and EJScreen) to create a series of methods for identifying disadvantaged communities. Performed literature review of economic inequality indicators and created recommendations for using these indicators to perform distributional analysis of 2016 Air Quality Management Plan policies on different communities as defined by demographic and environmental characteristics. Employed U.S. EPA's BenMAP-CE tool to analyze air quality related health impacts across communities, and hosted training workshops to teach SCAQMD staff to use the tool in support of future air quality management planning.

For NYSERDA, created methods to capture the air quality-related health benefits of updated codes and standards on disadvantaged communities and low-income households. Stefani worked within parameters defined by New York's Climate Leadership and Community Protection Act (CLCPA) and consistent with previous efforts to capture benefits of clean energy and energy efficiency measures in disadvantaged communities.

For CALIFORNIA ENERGY COMMISSION, developed both a reduced-form air quality health benefits calculator and guidance documents for full-form data-intensive analyses of health-related air quality benefits from individual state-funded projects focused on energy innovation across geographic resolution and scale.

For U.S. EPA OFFICE OF AIR AND RADIATION, performed an analysis of the impacts of climate change related to air quality and extreme temperature on socially vulnerable populations, including those who experience low income, are part of underrepresented racial and ethnic communities, have low educational attainment, or are over the age of 65. Developed and applied a new measure for assessing potentially disproportionate impacts by degree of global warming. Prepared technical documentation showing starkly disproportionate impacts of air pollution and extreme temperatures due to climate change across these socially vulnerable groups. Stefani led the analysis of climate change-related air quality impacts on socially vulnerable populations. (2021-2022)

For U.S. EPA OFFICE OF AIR AND RADIATION, managed analysis and update of epidemiological evidence to support fine particulate matter and ozone regulatory policy analyses. Led team to identify appropriate epidemiological studies relating health impacts to pollution exposure. Led discussion of this process at the virtual 2020 International Society of Environmental Epidemiology conference.

For the BUREAU OF OCEAN ENERGY MANAGEMENT, aided in the design of air quality benefits analysis and quantification module within the Benefits of Energy from Wind (Ben-Wind) planning model. Stefani identified epidemiological studies used to define concentration-response relationships for morbidity and mortality impacts associated with changes in air pollution emissions. (2017-2018)

For U.S. EPA OFFICE OF RESOURCE CONSERVATION AND RECOVERY, led the benefits assessment for the 2024 Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals (CCR) from Electric Utilities; Legacy CCR Surface Impoundments Final Rule. Calculated benefits associated with reduced exposure to lead, mercury, and arsenic through removal of CCR from groundwater and surface water sources, including non-cancer benefits for all three pollutants and cancer-related benefits for arsenic. (2022-2024)

For U.S. EPA OFFICE OF AIR AND RADIATION, led the analysis for comparison of human health benefits estimated using a series of reduced-form air quality models across a variety of representative air quality policy scenarios. Performed a review of literature and modeling tools to compare reduced-form model results with impacts and benefits quantified using full-form model predictions. Computed statistical measures to quantitatively compare reduced-form tools across policy scenarios. Stefani wrote a report on the analysis prepared as a Data in Brief manuscript.

For the NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, Stefani is directing the development of methods to better assess the human use damages associated with contamination in urban settings consistent with CERCLA regulations. Stefani is drawing from mixed methods across social impact assessments to be able to identify and quantify the generational impacts of contaminated water bodies or recreational areas.

Select Reports, Publications, and Presentations

Simon, H., Baker, K.R., Sellers, J., Amend, M., Penn, S.L., Bankert, J., Chan, E.A.W., Fann, N., Jang, C., McKinley, G., Zawacki, M., Roman, H. 2023. Evaluating reduced-form modeling tools for simulating ozone and PM2.5 monetized health impacts. Environmental Science: Atmospheres. doi:10.1039/d3ea00092c.

Achakulwisut, P.P., Anenberg, S.C., Neumann, J.E., Penn, S.L., Weiss, N., Crimmins, A., Fann, N., Martinich, J., Roman, H.A., Mickley, L.J. 2019. Effects of increasing aridity on ambient dust and public health in the U.S. southwest under climate change. *Geohealth*, 3(5): 127-144.

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Exhibit SP-2

BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF THE JOINT APPLICATION FOR APPROVAL TO ACQUIRE NEW MEXICO GAS COMPANY, INC. BY SATURN UTILITIES HOLDCO, LLC.	)	
	)	**Docket No. 24-00266-UT**
JOINT APPLICANTS	)	

JOINT APPLICANTS' RESPONSE TO
COALITION FOR CLEAN AFFORDABLE ENERGY'S FIRST SET OF
INTERROGATORIES AND REQUESTS FOR PRODUCTION OF DOCUMENTS

Joint Applicants hereby respond to Coalition for Clean Affordable Energy's ("CCAE") First Set of Interrogatories and Requests for Production of Documents ("Interrogatories").

GENERAL OBJECTIONS*:*

Joint Applicants object to CCAE's instructions and directions in the Interrogatories to the extent they seek to supplement or modify the requirements of 1.2.2.25 NMAC, et seq. or the Rules of Civil Procedure for the District Courts of New Mexico.

Joint Applicants object to the Interrogatories to the extent they seek information protected from disclosure by the attorney-client privilege or the work product doctrine. Rules 1-026 and 11-503 NMRA; 1.2.2.25(C) NMAC.

CCAE INTERROGATORY 1-1:

What are BCP/NMGC's transmission and distribution expansion plans during 2026-2030?

a. **What is its annual estimate of new customers, by class, during this time period?**
    i. **What proportion of these new residential and commercial currently use propane for space heating?**
b. **What is its annual estimate of new transmission investments during this time period (in terms of costs, miles of pipeline, and/or other applicable metrics)?**
c. **What is its annual estimate of new distribution investments during this time period (in terms of costs, miles of pipeline, and/or other applicable metrics)?**
    i. **NMGC currently plans on spending $21.9 million on "new mains" under its 2022-2025 distribution blanket (NMGC Exhibit TCB-2). Does BCP/NMGC plan to continue the same level of spending on new mains from 2026-2030?**
d. **What are BCP/NMGC's plans for adding any new facilities during this time period?**
e. **What does BCP/NMGC estimate as the costs of these expansions?**

RESPONSE:

Ryan A. Shell

NMGC does not have expansion plans for its transmission system during this time period. NMGC's distribution system expansion is generally driven by customer growth, which varies year-to-year.

a. Please see JA CCAE Table 1-1a.

 Exhibit SP-2

JA CCAE Table 1-1a

	2026	**2027**	**2028**	**2029**	**2030**
Rate 10 - Residential	4,193	4,228	4,261	4,296	4,331
Rate 30 - Irrigation	2	1	2	2	2
Rate 31 - Water & Sewage	-	-	-	-	-
Rate 35 - Cogeneration	-	-	-	-	-
Rate 37 - Gas Air Conditioning	-	-	-	-	-
Rate 39 - CNG Vehicle Fuel	-	-	-	-	-
Rate 54 - Small Volume	133	134	135	138	138
Rate 56 - Medium Volume	-	1	2	-	1
Rate 58 - Large Volume	-	-	-	-	-
Rate 61 - Sale for Resale	-	-	-	-	-
Rate 72 - Compressor Fuel	-	-	-	-	-
Rate 144 - District Energy Service	-	-	-	-	-
Rate 70 - Off-System Transportation	-	-	-	-	-
Discounted Transportation	-	-	-	-	-
Total	4,328	4,364	4,400	4,436	4,472

i. NMGC customer forecasts do not include a differentiation between new customers added through propane conversions versus new construction. Over the past five years, propane conversions have represented roughly 6% of the new customers added to the system.

b. NMGC is not planning to make new transmission investments for expansion during this time period.

c. The forecasted annual distribution investment for expansion is

Category	**2026**	**2027**	**2028**	**2029**
Distribution Blankets - New	22,506,283	20,760,203	20,678,782	21,580,625

i. Yes, with adjustments for inflation.

d. NMGC does not anticipate adding any new facilities for expansion during this time period.

e. Please see response to CCAE 1-1(b) and (c).

BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF THE JOINT APPLICATION	)	
FOR APPROVAL TO ACQUIRE	)	
NEW MEXICO GAS COMPANY, INC.	)	
BY SATURN UTILITIES HOLDCO, LLC.	)	
	)	**Docket No. 24-00266-UT**
	)	
JOINT APPLICANTS	)	
	)	

ELECTRONICALLY SUBMITTED AFFIRMATION OF

RYAN A. SHELL

In accordance with 1.2.2.35(A)(3) NMAC and Rule 1-011(B) NMRA, Ryan A. Shell, President for New Mexico Gas Company, Inc., affirms and states under penalty of perjury under the laws of the State of New Mexico: I have read the foregoing Joint Applicants' Response to Coalition for Clean Affordable Energy's First Set of Interrogatories and Requests for Production of Documents of Ryan Shell. I further affirmatively state that I know the contents of my respective responses and they are true and accurate based on my personal knowledge and belief.

SIGNED this 24th day of February 2025.

/s/Ryan A. Shell
Ryan A. Shell

BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF THE JOINT APPLICATION FOR APPROVAL TO ACQUIRE NEW MEXICO GAS COMPANY, INC. BY SATURN UTILITIES HOLDCO, LLC.	)	**Case No. 24-00266-UT**
JOINT APPLICANTS	)	

AFFIRMATION

I, Stefani L. Penn, swear and affirm under penalty of perjury under the laws of the State of New Mexico that the foregoing testimony is true and correct to the best of my knowledge, information, and belief.

SIGNED this 18th day of April, 2025

____
Stefani L. Penn

BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF THE JOINT APPLICATION FOR APPROVAL TO ACQUIRE NEW MEXICO GAS COMPANY, INC. BY SATURN UTILITIES HOLDCO, LLC.	)	**Case No. 24-00266-UT**
JOINT APPLICANTS	)	

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on this date I sent a true and correct copy of the foregoing *Direct Testimony of Stefani L. Penn on Behalf of Coalition for Clean Affordable Energy* to the parties listed below:

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DATED April 18, 2025,

Caitlin Evans
Paralegal
Coalition for Clean Affordable Energy