August 2021

Equity-Focused Climate Strategies for New Mexico

Socioeconomic and Environmental Health Dimensions of Decarbonization

Findings, Conclusions, and Recommendations

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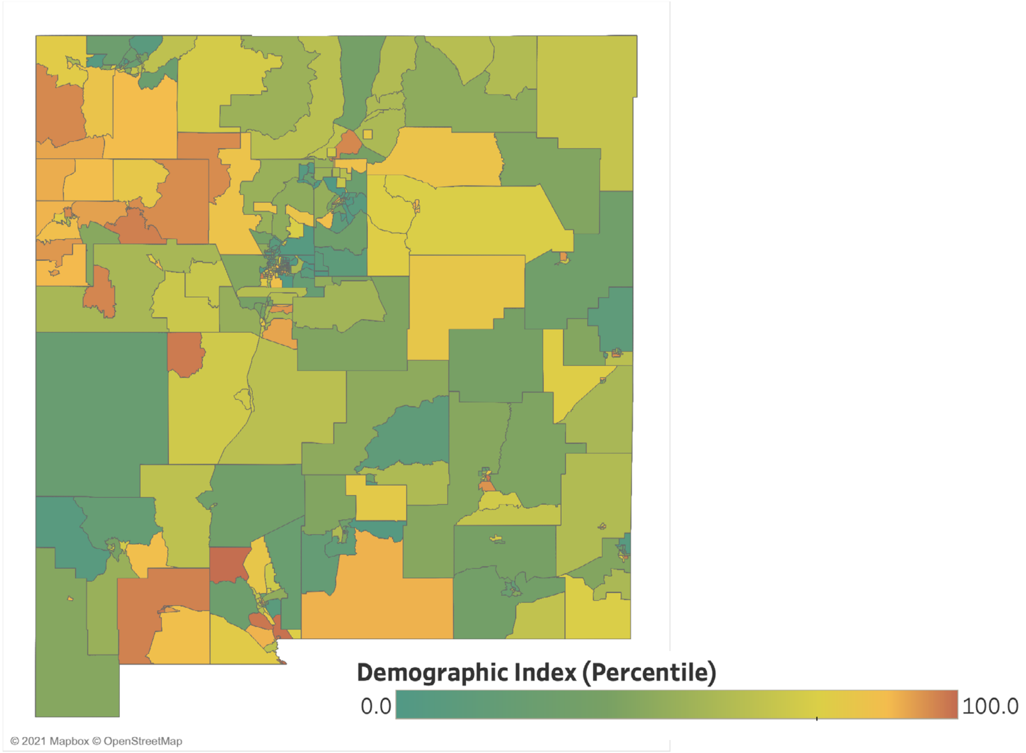
Executive Summary

The State of New Mexico is embarking on an ambitious multi-decade effort to mitigate and adapt to climate change. As part of this effort, the State has set aggressive targets to expand renewable electricity generation and slash economy-wide greenhouse emissions. Now, New Mexico is faced with the challenge of developing pathways and policies to achieve these goals.

New Mexico's current fossil fuel-based energy infrastructure—oil and gas production and processing, coal mining, and fossil fuel storage, transmission, and use—is not only a source of greenhouse gas emissions, but also a source of health-damaging air pollutant emissions across the state. The state's rural and indigenous populations face access barriers to reliable electricity, and some households lack access to electricity altogether. Furthermore, low-income households often struggle to pay for the electricity and fuels they need to power their homes and vehicles. Concerns about affordability and equitable access are particularly relevant to New Mexico, where the poverty rate is one of the highest in the country—a challenge that has been further exacerbated by the economic impacts of the COVID-19 pandemic.

These and many other social inequities impact every sector of New Mexico's economy. Decarbonization efforts should consider existing disparities to ensure strategies for transitioning to clean energy distribute benefits more evenly across the population.

ES Figure 1. New Mexico Demographic Index. In the Demographic Index, neighborhoods that are orange or red have a higher share of combined low-income, racial minority, limited educational attainment, linguistically isolated, elderly, and very young populations than other New Mexico census tracts.



In **Figure ES 1**, we created a Demographic Index to identify socially overburdened populations across the state; the high socioeconomic and demographic burdens faced by populations in both rural and urban areas motivate the need to develop clean energy pathways that simultaneously reduce environmental health burdens and increase resilience and economic security.

To *decarbonize* New Mexico's economy and reduce greenhouse gas emissions, the State will need to implement a suite of clean energy strategies, including the widespread adoption of energy efficiency, the electrification of all fuel use (e.g. electric vehicles and home appliances), and the expansion of renewable energy such as solar power to provide clean power for buildings, transportation, and industry statewide. These steps must be undertaken while simultaneously phasing out oil and gas production, which is responsible for more than half of the state's greenhouse gas emissions.

In this analysis, we assessed opportunities and strategies to integrate pollution reduction, resilience to climate impacts (e.g. heat waves), and energy and environmental equity into the state's decarbonization plans, with a focus on delivering these benefits to New Mexico's most environmentally overburdened and socially vulnerable communities.

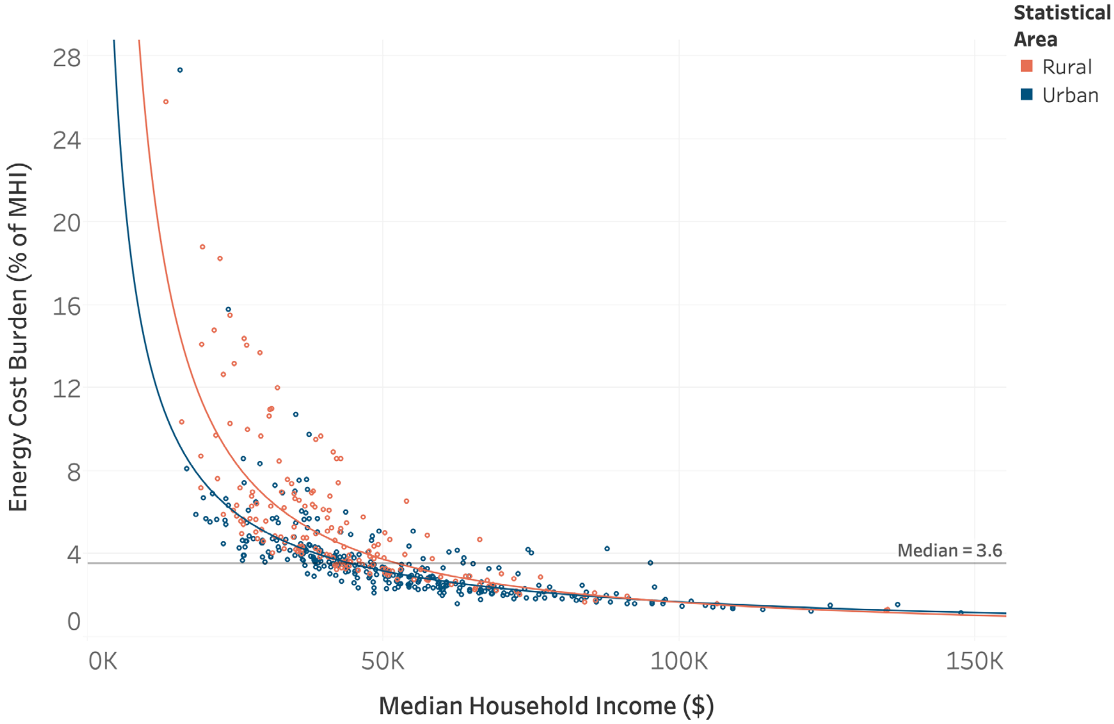
To do so, we

1. Identified regions and populations currently facing high cumulative emissions (i.e. multi-source, multi-pollutant emissions) from fossil fuel production and use,
2. Characterized household and transportation energy cost burdens and clean energy access across the state, and
3. Identified decarbonization strategies that simultaneously reduce health-damaging air pollution and energy cost burdens while increasing climate resilience.

For this last component, we analyzed four 2020-2050 decarbonization pathways developed by Evolved Energy and outlined in the forthcoming companion report *Climate Action in New Mexico.* A companion workforce study is forthcoming as well.

We find that decarbonization across New Mexico has the potential to improve public health and reduce energy cost burdens. However, our analysis also suggests that these co-benefits may not accrue evenly across the state and that disparities in fossil fuel pollution and economic impacts may be exacerbated with a decarbonization strategy focused exclusively on carbon emissions. Instead, environmental and energy equity goals have to be built into decarbonization strategies from the beginning. The findings, conclusions, and recommendations that stem from our analysis are presented below for each significant energy-consuming sector of New Mexico's economy. The development of integrated policy solutions will also require the full and ongoing engagement of impacted households and communities.

Residential Buildings

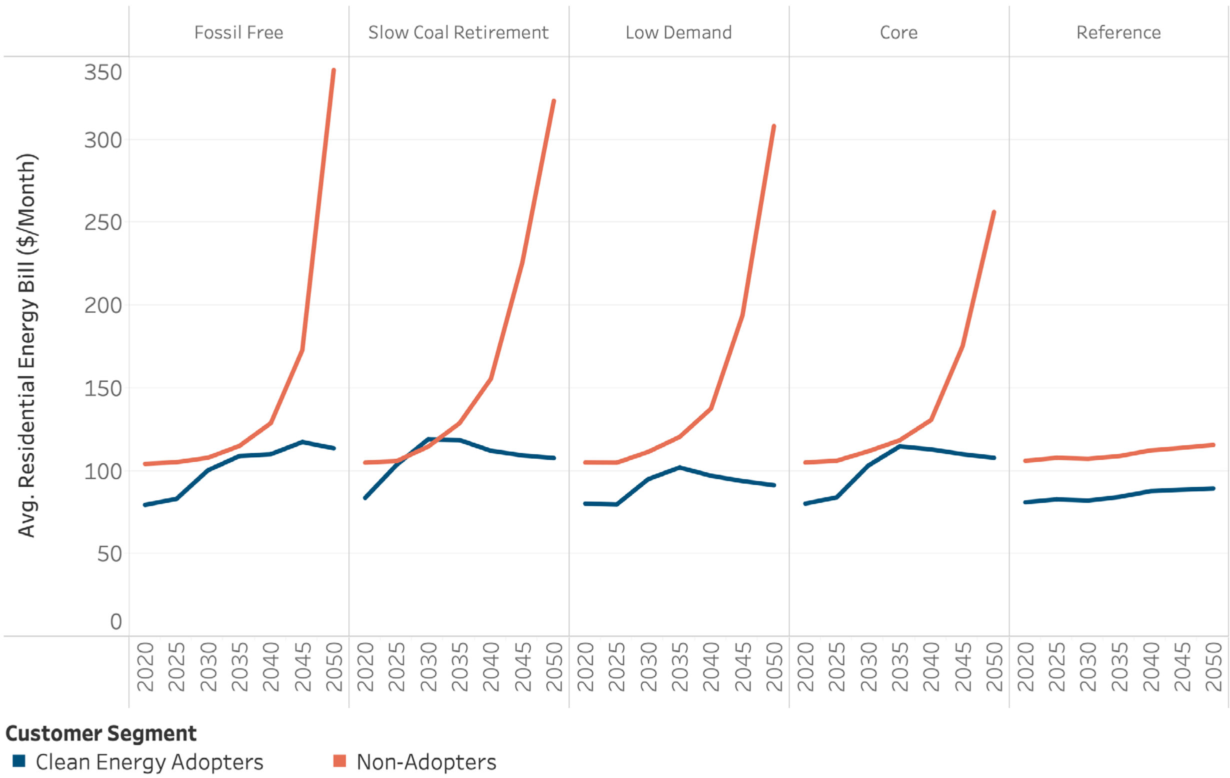


ES Figure 2. Residential household energy cost burdens. Energy costs burdens—the fraction of household income spent on residential utility bills—are higher in rural areas and substantially higher in low-income communities. Similar analyses of other demographic indicators found that burdens are also high in neighborhoods with high concentrations of Native American populations, immigrant populations, and multifamily or non-traditional housing units, as well as in rural households, many of which are served by small electric cooperatives which may lack the resources to subsidize their most cost-burdened customers.

Finding 1: Households in census tracts with more low-income households use less energy on average than census tracts with wealthier households, but face higher energy cost burdens—meaning they spend larger fractions of their income on utility bills. Native American, rural, and immigrant populations, as well as those in multi-family and mobile housing units, also face higher *energy cost burdens* and often lag in access to clean energy technologies such as rooftop solar.

Conclusion 1: Policy strategies which target primarily households with large carbon footprints and do not explicitly target populations with the highest energy cost burdens may disproportionately benefit the least economically vulnerable households and exacerbate existing socioeconomic disparities. Low-income households, rural communities, tribal communities, immigrant households, and others with high energy cost burdens would significantly benefit from cost-saving energy measures such as energy efficiency, and bill stabilization measures such as rooftop solar, but often face barriers to adopting clean energy technologies.

Recommendation 1: Ensure equitable access to the economic and health benefits of energy efficiency, distributed energy resources (e.g. rooftop solar + storage), and electrification to populations beyond home- and landowners. Potential measures include targeted programs and community outreach to identify and address barriers to adoption, provision of up-front financing rather than tax incentives, and development of targeted clean energy programs to serve low-income households and historically underserved communities.

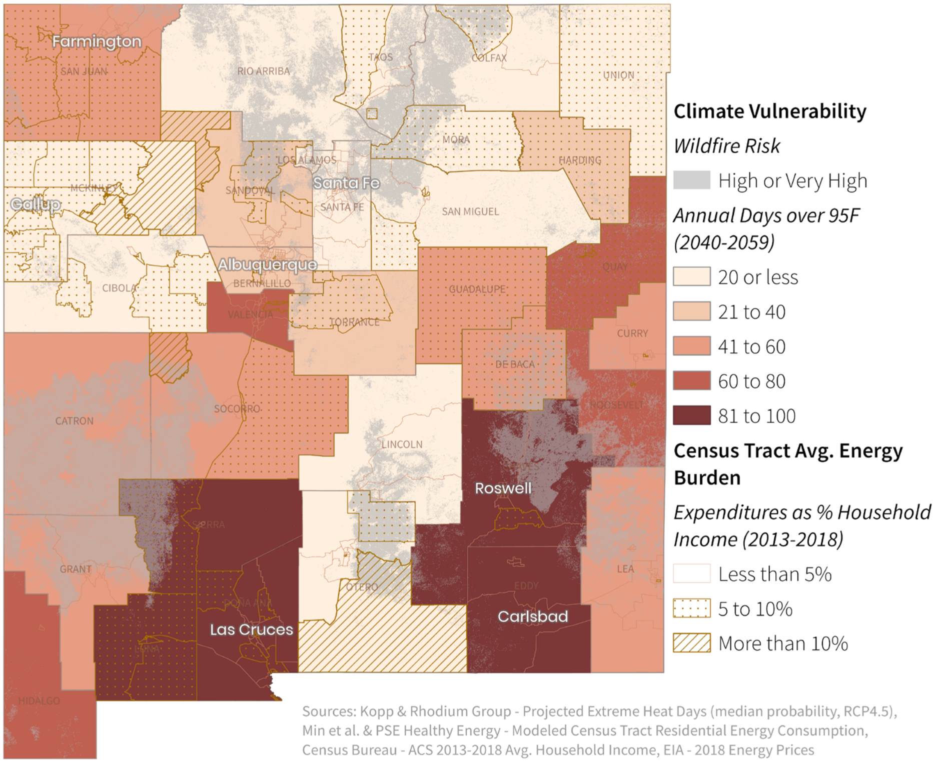


ES Figure 3. 2035-2050 household energy bills for clean energy adopters and non-adopters. Unless mitigation strategies are taken, all four decarbonization scenarios (outlined in the companion report) result in escalating utility bills after 2035 for households that continue to use natural gas and do not electrify their appliances. This is because fewer customers would be paying for upkeep of aging gas infrastructure. Clean energy adopters pay consistently lower energy bills in all scenarios.

Finding 2: Households that do not adopt clean energy technologies, including efficiency measures and the electrification of gas appliances, risk facing escalating utility bills in the 2035-2050 time period in order to cover the costs of transitioning away from an aging gas distribution system.

Conclusion 2: Historically, low-income households in New Mexico have significantly lagged behind wealthier households in adopting clean energy technologies because of barriers such as lack of access to financing. These households are likely to lag behind in electrification measures as well; and if so, their utility bills will continue to grow, as fewer households pay to maintain aging gas infrastructure.

Recommendation 2: Plan for a geographically targeted and complete phase-out of the natural gas distribution system, one area at a time. Target utility rate-stabilization for non- or late-electrification adopters and provide bill-stabilization measures, such as capping utility bills as a percentage of income for households at risk of adverse bill impacts during the transition to an electrified energy system.

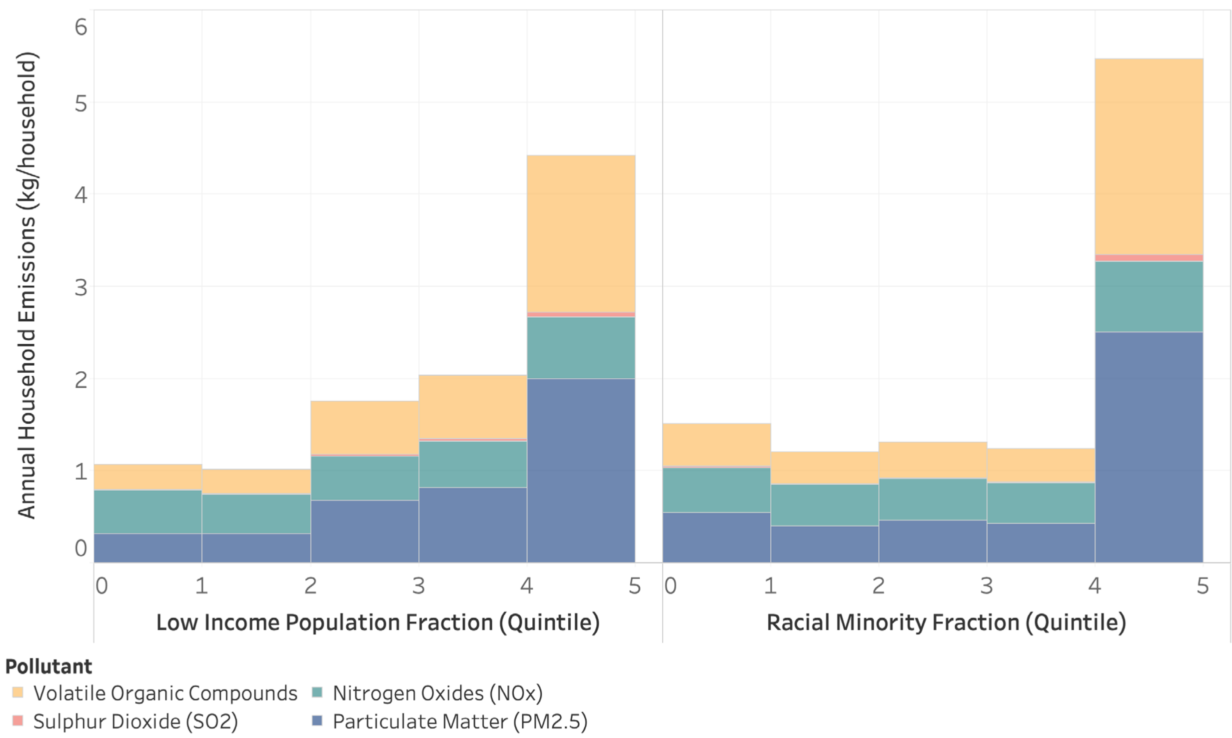


ES Figure 4. Climate vulnerability and energy cost burdens. Certain communities across New Mexico face cumulative stressors from high energy cost burdens as well as climate impacts such as extreme heat and high wildfire risk. These communities may benefit from resilience-focused and cost-saving energy measures.

Finding 3: New Mexico will face increased occurrences of extreme heat, wildfire, weather-induced grid outages, and other stressors related to climate change. These climate stressors may prove especially challenging for socially vulnerable New Mexicans, such as low-income households with high baseline energy cost burdens, those who rely on electricity to power medical devices, customers in counties with projected extreme heat risk, and households (largely within the Navajo Nation) with no access to electricity at all.

Conclusion 3: Efficiency measures, distributed solar + storage, and other clean energy measures may provide resilience and economic benefits to climate vulnerable groups such as low-income households, individuals requiring reliable electrical equipment for medical care, and households facing high utility bills, extreme heat, and additional climate stressors. Solar + storage can also provide electricity access to those whose homes are not connected to the grid.

Recommendation 3: Consider targeted incentives, clean energy deployment carve-outs, and other distributed energy resource deployment strategies to maximize public health and climate resilience benefits. These include an expansion of residential and community solar + storage systems in high-risk areas to provide backup during grid outages and electricity access to those without reliable electricity, particularly in rural areas and tribal nations. Efficiency upgrades and solar + storage may particularly benefit low-income households, sensitive populations such as medical baseline customers, and those facing extreme heat and other stressors related to climate change. The State should also consider shifting some utility-scale renewable energy and storage targets to smaller distributed energy resources throughout the community, including microgrids, in order to provide additional bill savings and resilience co-benefits.



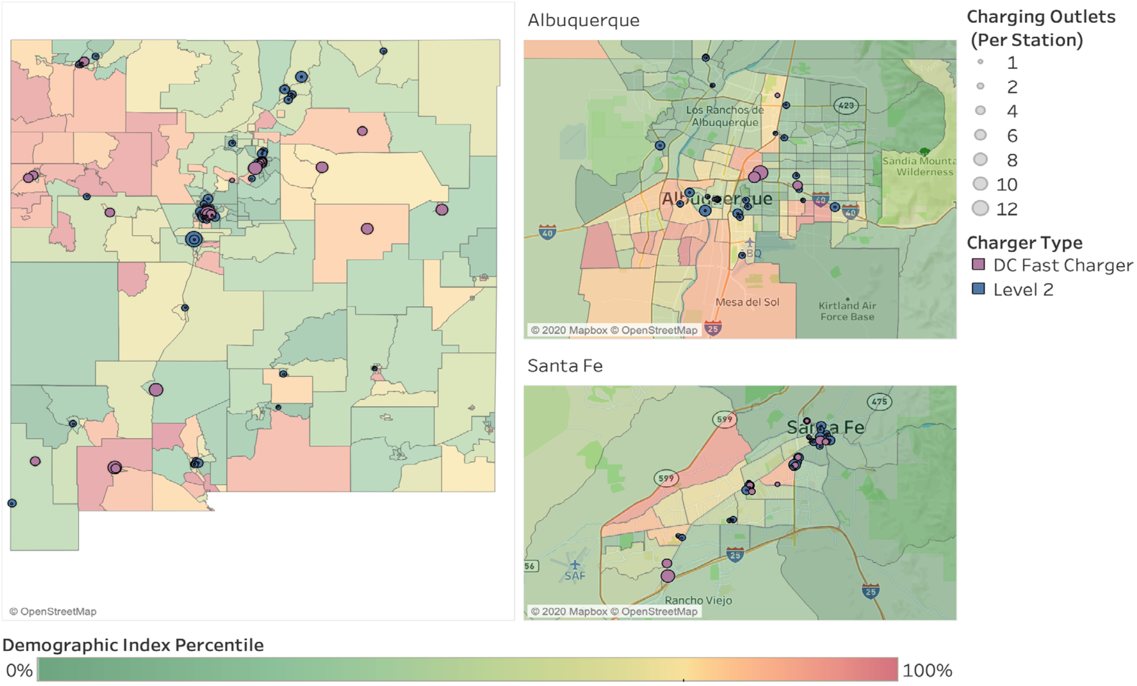
ES Figure 5. New Mexico residential air pollution emissions and demographics. Average annual household air pollutant emissions are significantly higher in census tracts where a higher fraction of the population are low-income and people of color. Census tracts are grouped into quintiles based on the fraction of racial minority and low-income populations in each census tract.

Finding 4: Approximately 50,000 New Mexico households (one in 15) use wood as their primary heating source. These households are disproportionately located on tribal lands; and nearly one in two households in majority Native American areas uses wood as their primary heating fuel. Wood burning emits more health-harming criteria air pollutants per unit of energy generated than other common home heating fuels. Households using other alternative fuels to power their homes, such as fuel oil, coal, and propane, may also experience significant in-home criteria air pollutant emissions.

Conclusion 4: Displacing wood, propane, and other unconventional fuels with electricity is likely to have the greatest reduction in criteria pollutant emissions, per household.

Recommendation 4: Prioritize early electrification of buildings using unconventional or alternative fuels (e.g. wood, propane, fuel oil, etc.) to reduce energy cost burdens and improve health outcomes in rural areas and on tribal lands. Where wood plays an important role in cultural traditions, high-efficiency low-emission pellet stoves may also help reduce emissions.

Transportation



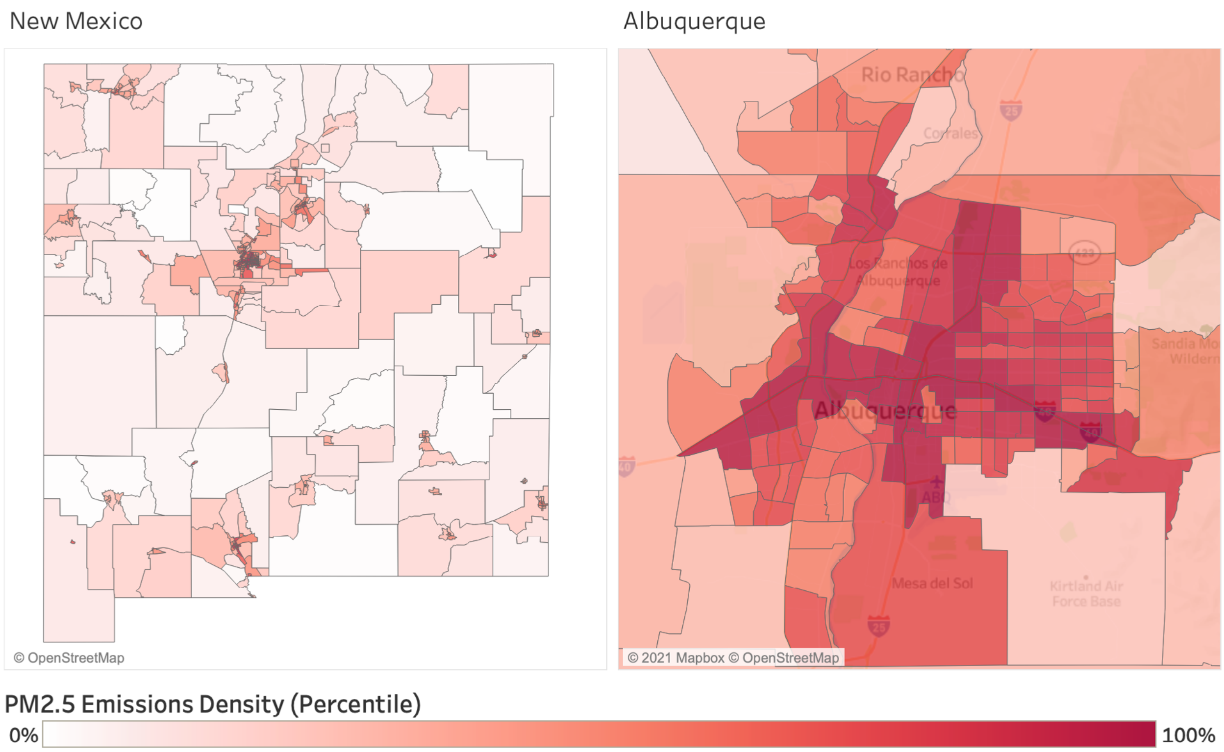
ES Figure 6. Public electric vehicle charging stations and demographic index in New Mexico, Albuquerque, and Sante Fe.[1] Each dot represents an electric vehicle charging station, while the bubble size reflects the number of charging outlets per station. Charging stations are largely located in urban areas and along interstate highways, but are limited in many rural areas and on tribal lands.

Finding 1: Although higher-income households drive more and consume more vehicle fuel on average, lower-income households in New Mexico pay a higher share of their income towards vehicle fuel. Households in rural areas, including tribal lands, tend to have high vehicle fuel cost burdens and face limited access to public transportation and electric vehicle charging infrastructure. Accounting for public transit costs, as well as the costs of vehicle ownership and maintenance, would result in even higher average transportation cost burdens for households across income levels.

Conclusion 1: Low-income households stand to benefit the most from financial savings associated with passenger vehicle electrification and affordable or free public transit. However, high upfront costs and other barriers to access mean these communities will likely be late adopters of electric vehicles without targeted assistance. Given the financial and logistical challenges of expanding public transit infrastructure in rural areas, this solution may be most feasible in urban areas. In low-income rural households, passenger vehicle electrification could help alleviate vehicle fuel cost burdens.

Recommendation 1: In addition to building affordable and accessible electrified public transit, design upfront financial incentives to support adoption of electric passenger vehicles. Target incentives to low-income communities suffering from disproportionally high vehicle fuel cost burdens and rural areas, including tribal lands with limited public transit access. Incorporate community input to guide public transit expansion and electric vehicle charging infrastructure investments in order to facilitate electric vehicle adoption among households facing access barriers.

1 The map includes AC Level 2 (240v) and DC fast charging outlets, the latter of which provide electric vehicles with a higher travel range per unit of time charging.



ES Figure 7. Census tract percentile ranking by density of particulate matter ($PM_{2.5}$) emissions from heavy-duty and medium-duty trucks in 2017, statewide and in Albuquerque. Truck pollution is most dense in urban areas, particularly along urban interstate and highway corridors. Black, Asian American, and Hispanic populations in New Mexico are typically exposed to greater pollution from trucks than White and Native American populations.

Finding 2: Particulate matter emissions from on-road vehicles are more dense, on average, in urban areas and near communities with a higher share of Black, Asian American, and Hispanic populations. Emissions are greatest per unit area along urban highway corridors, where trucks, particularly those of older vintages, contribute disproportionately to nitrogen oxides and particulate matter emissions.

Conclusion 2: Older models of medium-duty and heavy-duty trucks emit much more particulate matter and nitrogen oxides per mile traveled than newer models. Prioritizing the retirement of older truck models will therefore be critical to reducing emissions along urban interstates in the coming decade.

Recommendation 2: Accelerate medium- and heavy-duty truck electrification and emission reductions by 1) prioritizing the retirement of old, high-emitting heavy-duty and medium-duty trucks, 2) providing sufficient financial incentives for small businesses to convert their trucks, 3) rerouting trucks away from dense, urban areas with high cumulative environmental burdens, 4) limiting diesel truck idling, and 5) creating enforceable in-state targets to divert freight trucking to rail and to support interstate trucking electrification goals.

Finding 3: The Low Demand decarbonization scenario, which prioritizes public transportation and alternative transit modes like walking and biking, yields the lowest costs and most significant public health benefits by reducing overall vehicle travel and associated emissions.

Conclusion 3: Public transit expansion, which results in co-benefits such improved mental and physical health outcomes associated with increased walking, can promote broad public health and economic benefits.

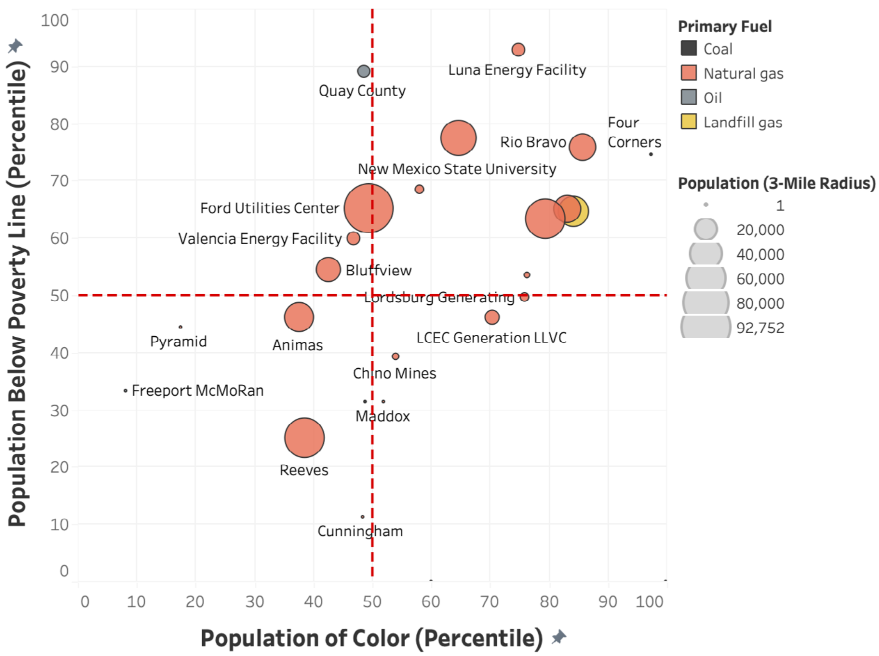
Recommendation 3: Where appropriate, coordinate efforts by local, regional, and state governments, with outreach to local communities, to expand electrified low- or zero-fare public transit. These efforts can reduce transit-related pollution and overall vehicle travel while improving transportation access for mobility-limited households.

Electricity Generation

Finding 1: New Mexico's remaining coal plants, and associated mines and waste disposal, are primarily located near rural tribal communities. While the San Juan Generating Station is scheduled to close in 2022, the Four Corners plant is expected to continue to run. Therefore, health-damaging pollutant emissions from the plant will continue to affect New Mexico's population, regardless of the fact that the plant's electricity is largely exported from the state and its greenhouse gas emissions are not included in the state's inventory.

Conclusion 1: New Mexico must consider public health as well as greenhouse gas targets in its phase-out of coal. To achieve health benefits, Four Corners must retire as well, and pollution on site must be remediated along with any legacy coal infrastructure across the state.

Recommendation 1: Rapidly retire remaining coal, including Four Corners, and remediate polluted mining, power plant, and coal ash disposal sites.



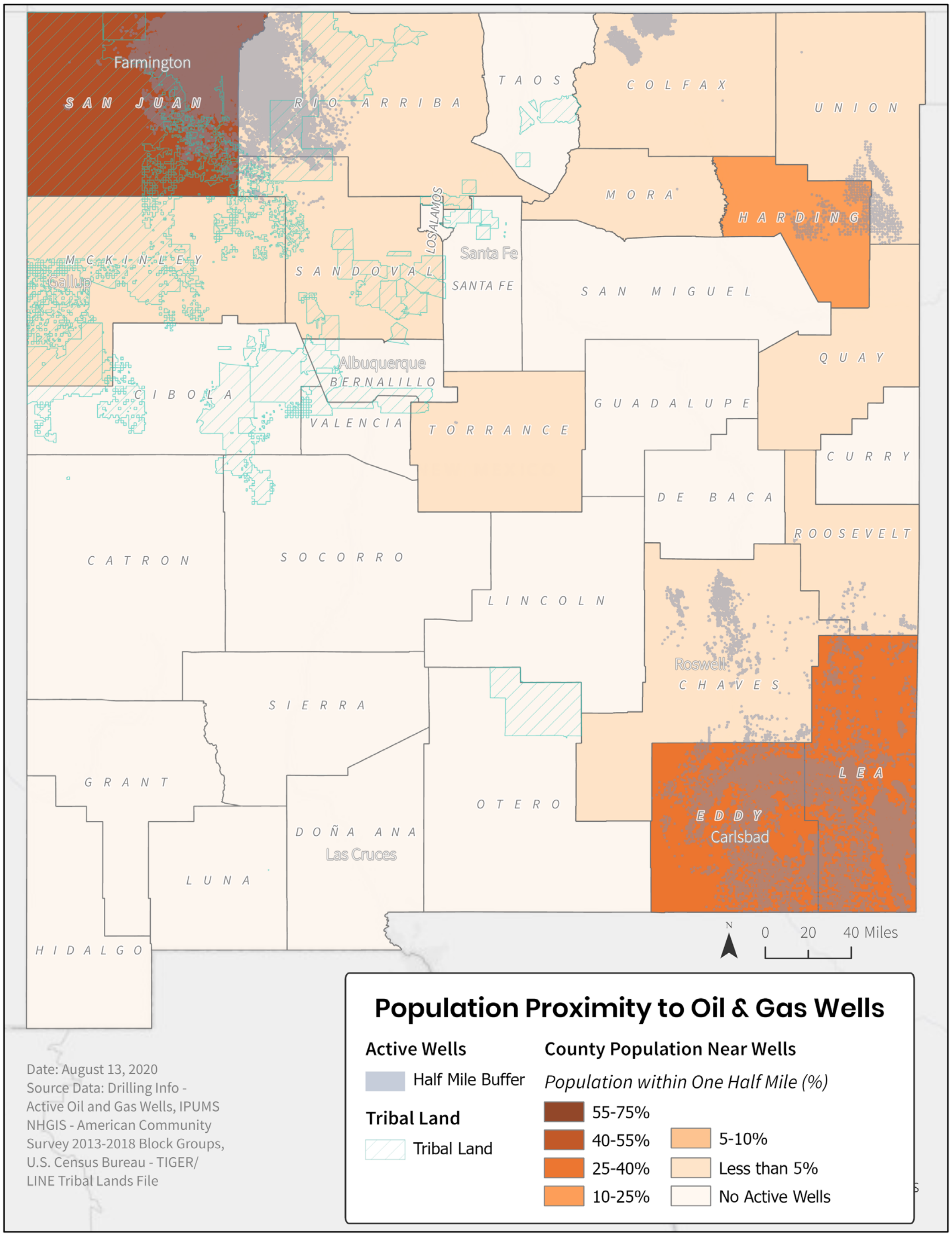
ES Figure 8. Income and racial demographics of populations living within a three-mile radius of New Mexico power plants. The urban plants (those represented by larger bubbles) are disproportionately located in the state's low-income communities. A number of plants are not shown because no one lives within a three-mile radius of these facilities.

Finding 2: While many of New Mexico's power plants are in rural areas, its urban power plants—which largely burn natural gas—are disproportionately located in communities with a higher share of low-income households than the median for the state.

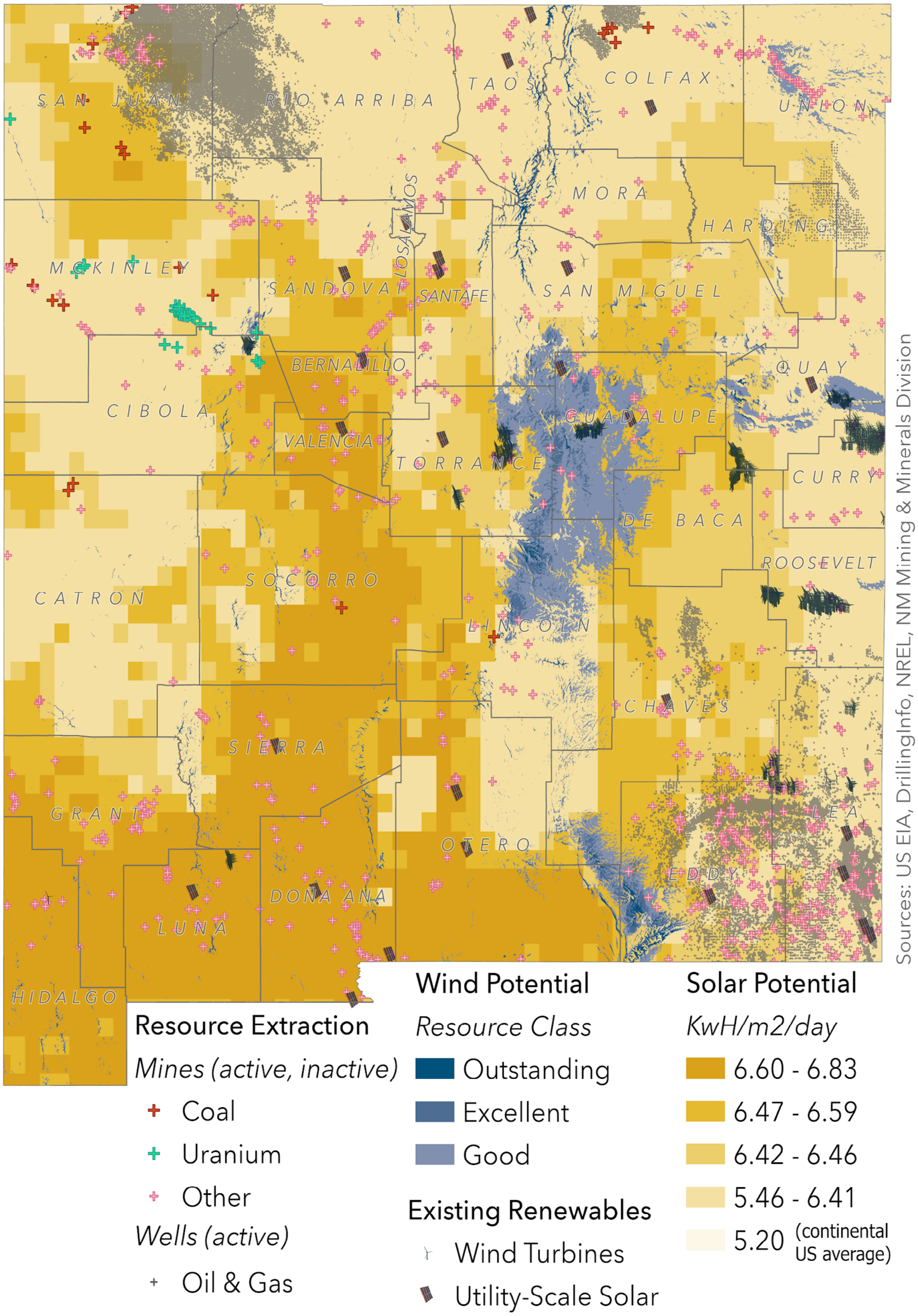
Conclusion 2: Most of the decarbonization scenarios rely on retaining some natural gas plants for reliability. The State therefore runs a risk that these gas plants will disproportionately be those in urban, low-income communities.

Recommendation 2: Ensure that power plants left online for reliability are not disproportionately those in socioeconomically disadvantaged communities with high cumulative environmental burdens. Some of these plants may be feasibly replaced in the near term with a suite of large-scale energy storage systems and distributed energy resources to reduce peak demand requirements.

Industry



ES Figure 9. Populations near oil and gas wells. An estimated one in fifteen New Mexicans lives within half a mile of an active oil or gas well, largely in the San Juan Basin in the Northwest and the Permian Basin in the Southeast, and may be exposed to associated health hazards.



ES Figure 10. Renewable energy opportunities and legacy extractive industries. As demand shifts from petroleum resources to renewable energy, the State must assure that legacy infrastructure such as mines and wells are safely closed and remediated without undue burden on nearby communities or taxpayers. Simultaneously, there is an opportunity to create long-term renewable energy jobs in regions that have historically been economically dependent on polluting industries. Both imperatives are critical to achieving an equitable energy transition.

Finding 1: The oil and gas sector is responsible for more than half of the state's greenhouse gas emissions, including both carbon dioxide and methane, and production emits nitrogen oxides, volatile organic compounds, hazardous air pollutants, and other pollutants associated with adverse birth outcomes, respiratory disease, cancer, and other public health impacts.

Conclusion 1: Human health and climate goals can be achieved, in part, by pursuing best practices such as green completions (to capture the first flow of gas after a well is drilled), improved emissions monitoring, and oil and gas infrastructure setbacks. However, the full climate and health impacts of oil and gas production cannot be mitigated without phasing out production entirely.

Recommendation 1: Minimize the public health impacts of oil and gas development on those who live, work, and play near infrastructure by 1) implementing increased setback distances between oil and gas infrastructure and hospitals, schools, and homes, 2) deploying best available emission monitoring, leak detection, and control technologies for methane, non-methane VOCs, and other criteria and hazardous air pollutants as soon as possible, and 3) fully phasing out in-state oil and gas production and processing by 2050 or earlier.

Finding 2: Extractive industries are historically responsible for many jobs in New Mexico, as well as significant amounts of health-harming pollution. Emerging renewable energy industries provide long-term job opportunity with potentially decreased health risk for workers and neighboring communities. Without proper decommissioning and cleanup, New Mexico may face ongoing health and environmental hazards associated with abandoned oil and gas wells, contaminated fossil fuel production sites (including coal, oil, and gas), and other associated infrastructure.

Conclusion 2: New Mexico has excellent renewable energy potential. As the State makes this economic and clean energy transition, pollution from legacy extractive infrastructure will require regular monitoring, sufficient funding, and regulatory accountability mechanisms to assure proper remediation.

Recommendation 2: Fund and prioritize site remediation and reclamation for retired industrial facilities, particularly oil and gas wells and infrastructure, mining and manufacturing sites, and coal infrastructure. Explore opportunities to transition these pollution-burdened regions to support clean energy infrastructure and jobs, including support for workforce and economic development opportunities to smooth this transition.

About PSE Healthy Energy

Physicians, Scientists, and Engineers for Healthy Energy (PSE) is a multidisciplinary, non-profit research institute that studies the way energy production and use impact public health and the environment. We share our work and translate complex science for all audiences. Our headquarters is located in Oakland, California.

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