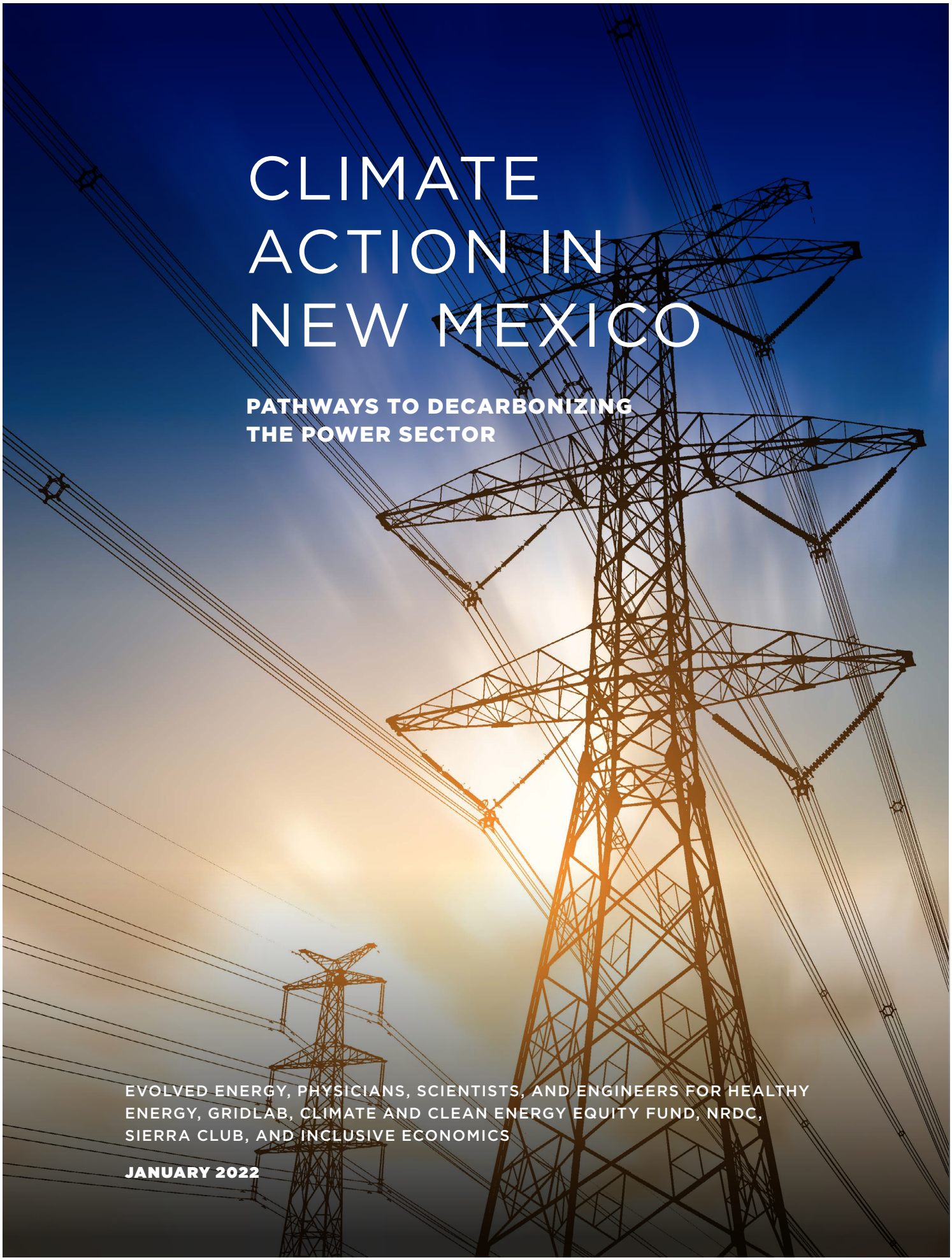

CLIMATE ACTION IN NEW MEXICO

PATHWAYS TO DECARBONIZING THE POWER SECTOR

EVOLVED ENERGY, PHYSICIANS, SCIENTISTS, AND ENGINEERS FOR HEALTHY ENERGY, GRIDLAB, CLIMATE AND CLEAN ENERGY EQUITY FUND, NRDC, SIERRA CLUB, AND INCLUSIVE ECONOMICS

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INTRODUCTION

Decarbonizing the power sector is essential to decarbonizing New Mexico's economy. Developing a clean, affordable, and reliable electricity grid in New Mexico will unlock electrification as a strategy for decarbonizing other sectors, like transportation and buildings. Through its abundance of high-quality wind and solar resources, New Mexico has an unparalleled opportunity to deliver clean, low-cost power to households across the American West while reducing carbon pollution, creating jobs, and fostering economic development for its residents. Because of these resources, the power sector is the cheapest sector to decarbonize today.

The clean energy transition depends on New Mexico rapidly building out wind and solar energy over the next decade. Increasing wind and solar capacity in the state will not only capture climate and health benefits, but will also generate income and jobs for New Mexicans through power exports. The Energy Transition Act of 2019 (ETA) is an important step towards this renewable-powered future, but modeling shows that it is cost-effective and feasible for the power sector to transition even faster than the 2045 target set by the ETA. Achieving this pace is essential for New Mexico to cut emissions 50 percent by 2030.

METHODOLOGY

This brief is based on modeling of New Mexico's energy system conducted by Evolved Energy Research using the **EnergyPATHWAYS** tool and the **Regional Investment and Operations** (RIO) platform[1]. These models use input assumptions about policy decisions, fuel price forecasts, technology costs, and technology performance to output a least-cost representation of the energy system under a set of carbon-emissions constraints. This analysis compares four scenarios: a **Reference** case, which is not required to meet carbon emission reductions beyond business as usual, and three **Decarbonization** pathways which achieve the state's goal of net-zero greenhouse gas (GHG) emissions by 2050 and 50 percent emissions reductions by 2030 relative to 2005[2,3].

1 Haley, B., Jones, R., Kwok, G., Hargreaves, J., Farbes, J., & Williams, J. H. (2019). (rep.). *350 PPM Pathways for the United States.* Evolved Energy Research. Retrieved 2021, from https://docs.wixstatic.com/ugd/294abc_95dfdf602afe4e11a184ee65ba565e60.pdf.

2 A similar analysis was done for decarbonization pathways in Colorado: Krishnaswami, A., Gonzalez, A., Gerhart, M., (September, 2020). *Committing To Climate Action Equitable Pathways For Meeting Colorado's Climate Goals*. Retrieved October 2021, from https://gridlab.org/wp-content/uploads/2020/10/GridLab_Colo-Clean-Energy-Economy.pdf.

3 The Governor had previously signed an Executive Order in 2019 that set a target of 45 percent emissions reductions by 2030 relative to 2005, though this was modeled at 50 percent. The state's net-zero goal was announced by Governor Lujan Grisham in 2021 and is expected to be codified in the January 2022 legislative session.

POLICY RECOMMENDATIONS

1. **Accelerate the state's clean energy target to 90 percent by 2030 and 100 percent by 2035.**

   Under every scenario modeled, the power sector must achieve over 90 percent emissions reductions by 2030 in order to reach the economy-wide net-zero goal by 2050. The modeling shows that the least-cost pathways to achieving these emissions reductions involve the full transition to renewable resources for electricity generation by 2035. Under the business as usual ("Reference") case, continued reliance on coal and natural gas for electricity generation undermines the sector's ability to achieve the emissions reductions necessary to meet New Mexico's climate targets.

2. **Retire all remaining coal units in the state by 2025 and remediate legacy coal infrastructure sites across the state.**

   Under every decarbonization pathway modeled, all coal-powered generating units must be retired no later than 2025 to unlock the least-cost pathways to power sector decarbonization and achieve the state's targets. Under the Reference scenario, the Four Corners plant stays online until 2031, and New Mexico utilities continue to import coal-fired power from neighboring states through 2040. In addition to accelerating plant retirements and ending imports of polluting power, the state should remediate abandoned coal infrastructure sites — including those used for mining, power generation, and coal ash disposal — to eliminate emissions and public health impacts associated with these sites. The sooner these facilities are retired and these sites remediated, the greater the health benefits to surrounding communities that have been historically overburdened by coal pollution. As enabled by the ETA, securitization can fund just transition assistance programs for workers impacted by coal retirements.

3. **Expand state and utility energy efficiency programs and incentives.**

   Under every decarbonization pathway considered by the model, energy efficiency is leveraged to reduce energy demand and overall pressure on the electricity grid. The modeling shows that maximizing energy efficiency is the most cost effective pathway for reducing cost burdens on ratepayers while limiting energy waste and continuing to deliver reliable energy services. The Low Demand scenario yields the lowest cost emissions abatement opportunity and achieves a 17 percent reduction in buildings' overall electricity demand relative to the business-as-usual case by 2050[4]. In addition to providing substantial additional funding for low income building improvements, the state should direct utilities and co-ops to expand energy efficiency programs and adopt utility performance metrics tied to the evolution, reach, and whole-building savings of these programs.

4 The Core scenario, by comparison, achieves a 6 percent reduction in buildings' overall electricity demand relative to the Reference case.

These programs should target customers with high energy and pollution burdens—including customers at risk of disconnection due to the pandemic-induced economic crisis as well as low-income households. These programs should use direct financial assistance mechanisms and simplified processes to eliminate barriers to energy efficiency for low-income customers, which include high capital costs for installations, split incentives for renters, and difficult sign-up processes.

4. **Design utility programs to ensure universal access to affordable electricity, including shutoff protections and graduated electricity rates.**

   Many families across New Mexico, particularly in rural areas and tribal communities, lack access to reliable electricity. For some, the barrier is lack of transmission infrastructure. Thousands of households across New Mexico, mostly concentrated within the Navajo Nation, live in areas underserved by transmission lines or have yet to be connected to an electricity grid. For others, the barrier is an inability to afford electricity bills: New Mexico has the third highest poverty rate in the country, and the number of families impacted is only increasing in light of the pandemic and ensuing economic crisis.[5,6]. As the state transitions to clean energy, the state must work with utilities to ensure universal access to affordable electricity through progressive programs that protect families unable to afford their bills and at risk of disconnection.

ANALYSIS

Abundant wind resources are key to decarbonizing New Mexico's electricity grid. New Mexico's wealth of wind resources have the potential to deliver significant levels of low-cost, carbon-free power across the mountain region. Under all decarbonization scenarios modeled, the least-cost electricity portfolios move to a majority wind-powered system over the next several decades (Figure 1). In the principle ("Core") decarbonization scenario, 88 percent of load is met by renewable resources by 2030, far outpacing New Mexico's 50 percent renewable portfolio standard requirement. **To achieve the economy-wide emissions target, New Mexico must build over twice as much new renewable capacity each year of the next decade as would otherwise be built in the Reference case (Figure 2). That build-out of wind and solar resources must continue into the 2030s and 2040s.** Rapidly decarbonizing the electricity grid, at this speed and scale, is essential to unlocking decarbonization solutions across other sectors of the economy (including Transportation and Buildings) which will increasingly turn to electrification to transition off of fossil fuels[7].

5 https://www.psehealthyenergy.org/wp-content/uploads/2021/08/Equity-Focused-Climate-Strategies_New-Mexico_Report.pdf
6 https://www.dws.state.nm.us/Portals/0/DM/LMI/Poverty_in_NM_2019.pdf
7 Read more about decarbonizing New Mexico's vehicles and buildings in the Transportation and Buildings sector briefs.

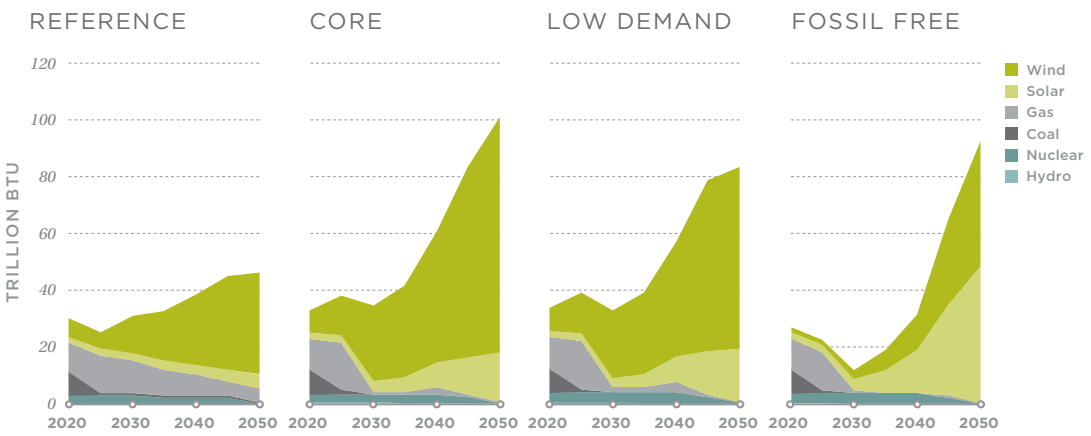

FIGURE 1. *Electricity generation in New Mexico, 2020-2050.*

FIGURE 2. *New power plant capacity in New Mexico, 2020s-2040s. Under the Core case, 0.41 GW/year of solar, wind, and storage are built, compared to 0.16 GW/year under the Reference case. Under the Fossil Free scenario, an average of over 6GW/yr must be built.*

Electrification across sectors increases electricity load and highlights the need for strategic reliability efforts. Where technically feasible, the electrification of buildings, vehicles, and some industrial processes is largely the most cost effective and efficient pathway to decarbonizing other sectors and improving local air quality. This degree of electrification is expected to significantly increase loads on the electric grid system over the next three decades. In the Core scenario, total power generation is projected to nearly double relative to the Reference case in 2050, up to 60 percent (or 97 TWh) of the state's final energy demand. However, due to the efficiency of electrification over combustion in addition to increased energy efficiency measures, the overall final energy demand (which includes other fuel use in addition to electricity use) of the Core case is two-thirds that of the Reference case by 2050.

Meeting this demand will require the expansion of the electricity system such that it can generate and transmit three times as much electricity as it does today. As the system expands and the penetration of renewable resources relative to coal and gas increases, grid planning must prioritize strategies to support renewable integration and reliability. For example, transmission load balancing and energy storage, including utility-scale batteries, will play a critical role in meeting peak demand requirements by storing excess generation for later use. Demand response programs and load flexibility can reduce these 'peaks' by shifting vehicle charging and other end-use equipment away from peak demand hours and towards hours of excess renewable generation. Policies such as strategic utility rate design can also incentivize behaviors such as load shifting and improve overall grid operations. Distributed energy resources, including microgrids and behind-the-meter solar plus storage systems, can also bolster reliability in rural areas by directly supplying homes and communities, separately from the central grid.

HOURLY GENERATION

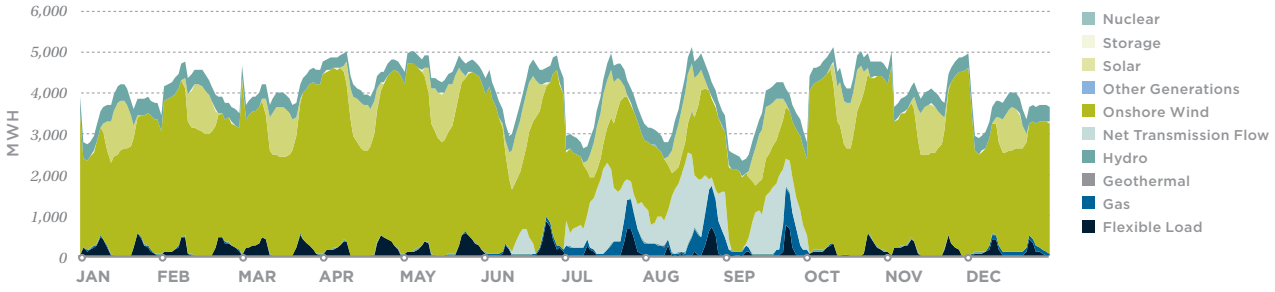

FIGURE 3. *a. Projected hourly electricity generation dispatched in New Mexico in 2030. In addition to flexible load (in navy), infrequent fossil gas (in orange) operates in the near term during summer months (June through September) where lower wind energy output coincides with peak demand. Critically, any fossil gas left online for reliability must not be left in communities overburdened by pollution.*

Fossil fuel use for power is phased out. Despite the state's historic dependence on coal and fossil gas for electricity, every least-cost pathway shows the steep decline of fossil fuel use for power generation, even in the Reference scenario. In order to achieve climate targets, all of New Mexico's coal-powered units must be retired within the next 5 years. In the same vein, the state must also stop importing power from coal-fired generators in other states. New Mexico's largest utility, PNM, is on the right track by planning to retire the San Juan Generation Station in 2022 and proposing to exit the Four Corners Generating Station. However, Arizona utilities plan to continue the operation of Four Corners until at least 2031, meaning air pollution from the plant will continue to harm New Mexican and Navajo communities in the region until the plant is shut down. Other utilities, including Tri-State and Xcel, continue to import uneconomic coal-fired power into New Mexico from Texas and Arizona. Fossil gas-powered generation ramps down sharply after 2025 and is nearly phased out by 2050 in the Core scenario (Figure 1). As outlined earlier, as electricity load increases, the model shows an increase in fossil gas use relative to the Reference case to provide increased grid reliability in the near-term. This highlights the need for policies that address the air pollution impacts of remaining fossil gas, particularly near communities with high pollution burdens.

Energy efficiency can reduce energy burden on households. New Mexico can reach its climate goals while decreasing household energy costs. Relative to the business-as-usual case, New Mexican households could spend 12 percent less on energy costs if the state pursues bold energy efficiency measures and building retrofits, as modeled by the Low Demand scenario. Assuming moderate energy efficiency measures, the Core scenario's per-capita electricity costs remain within 5 percent of the Reference case; by 2050, there is no difference in cost between the Reference and Core cases (Figure 4). Shifting energy costs away from the volatility of oil and gas prices—including the significant gas price spikes seen in 2021—by replacing fossil fuels with renewable resources also brings stability to household energy bills, which have been subject to fluctuations over the past few decades.

Policies must ensure that the benefits of the clean energy transition are distributed equitably across New Mexico. This means expanding electricity access and reducing energy burdens for New Mexico's most impacted communities. Low-income households across the Mountain West, including New Mexico, **spend a median of 6.9 percent of their income on residential energy bills**, compared to the national median of 2.9 percent. Meanwhile, many households across rural New Mexico lack reliable electricity access—in particular, **nearly one third of the 55,000 homes** in the Navajo Nation do not have electricity, representing 75 percent of all unelectrified households in the United States. Securing immediate and universal access to affordable electricity throughout New Mexico should be the first priority of any investments in expanding the electricity system.

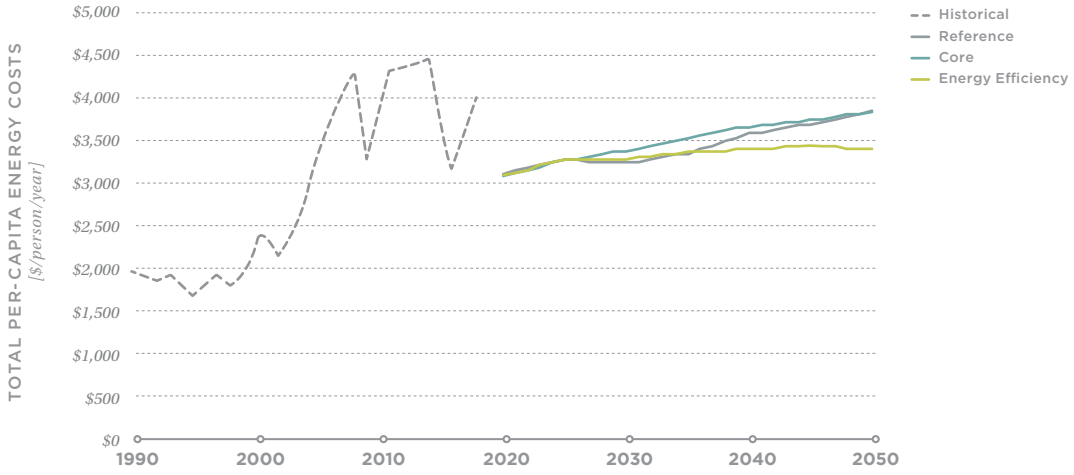

FIGURE 4. *Per capita energy costs in New Mexico, 1990-2050.*

MODEL ASSUMPTIONS

Reference	No emissions reductions required; **does not meet net-zero goals.** Business as usual assumptions based on existing policy and market conditions.
	For the power sector: Coal plants that have firm retirement commitments are assumed to retire on time.
Core	**Principal decarbonization scenario** upon which other scenarios are built. Meets 2030 and 2050 goals through ambitious but practical demand- and supply-side transformations to achieve the most cost-effective energy supply portfolio. Relies on rapid electricity decarbonization before 2030 and electrification of end-use applications and a limited deployment of low-carbon fuels by 2050.
	For the power sector: Coal plants that have firm retirement commitments retire on time or earlier if cost effective. Electricity generation mix is optimized based on cost and economy-wide emissions constraints.
Low Demand	Built upon the Core scenario, but designed to assess the benefits of **reducing demand through increased energy efficiency measures** (including existing home retrofits, public transit infrastructure buildout, and reduced heavy-duty vehicle and aviation use).
	For the power sector: Same as Core.
Fossil Free	Built upon the Core scenario, but **designed to achieve zero fossil fuel production and use** across the United States by 2050. Given that this is a more limiting constraint than the state's net-zero target, this scenario is not an "apples-to-apples" comparison with the other scenarios but rather one to provide insight into the state relying solely on wind, solar, hydropower, and geothermal as resources to decarbonize the power sector.
	For the power sector: Same as Core.