



August 2024

ECONOMIC AND HEALTH IMPLICATIONS OF CLOSING COMANCHE 3 AND THE CASE FOR RENEWABLE ENERGY



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EXECUTIVE SUMMARY

The retirement of the Comanche 3 coal-fired power plant in Pueblo, Colorado by 2031 presents both challenges and opportunities for the local community and the state's energy future. While the closure will result in significant economic impacts, including the loss of 77 direct jobs and an estimated \$31 million in annual tax payments, it also offers substantial health and environmental benefits. Comanche 3 is currently a major source of pollution, emitting over 4.2 million tons of CO₂ and over 2 million pounds of toxic chemicals annually. These emissions contribute to higher rates of respiratory diseases and cancer in nearby communities, particularly affecting communities of color.

The social cost of carbon for Comanche 3's emissions is approximately \$285.6 million per year, representing the economic benefit of closing the plant. The U.S. Environmental Protection Agency's (EPA) CO-Benefits Risk Assessment (COBRA) tool estimates that the closure of Comanche 3 would result in avoided health costs benefiting Colorado between \$52 million and \$67 million annually, with Pueblo County specifically benefiting between \$4.6 million and \$5.6 million from avoided health costs.

While advanced nuclear energy has been proposed as a replacement option, it presents significant risks and challenges:

1. **Economic challenges:** Nuclear plants are extremely expensive to build and maintain, with costs potentially reaching billions of dollars.
2. **Environmental and safety risks:** Nuclear power produces radioactive waste requiring secure storage for thousands of years and carries the risk of severe accidents.
3. **Operational and technical issues:** Current nuclear technologies remain largely experimental and unproven at a commercial scale.
4. **Community and regulatory concerns:** Previous attempts to build nuclear plants in Pueblo have faced strong community opposition.

In contrast, renewable energy alternatives such as solar and wind offer safer, more immediate, and often cheaper solutions to meet energy needs while providing economic benefits. Studies suggest that investing in solar energy on a small percentage of agricultural land could meet all electricity demands while providing additional income for farmers.

Given these factors, prioritizing investments in renewable energy sources presents a more viable path forward for Pueblo and Colorado. This approach can address both energy demands and economic stability while ensuring a cleaner, safer, and more sustainable energy future for the community and the environment.

BACKGROUND

The Comanche 3 coal-fired power plant in Pueblo, Colorado is set to close by 2031, earlier than its originally planned 2070 retirement. This closure will significantly impact the Pueblo community, resulting in the loss of highly paid, skilled jobs and substantial tax revenues. The plant currently provides \$196 million in economic impact annually and contributes over \$25 million in tax payments to Pueblo County. Xcel Energy, which operates Comanche 3, has initiated a planning process to explore replacement options, including advanced nuclear energy and a combined cycle gas plant with carbon capture.

Economic and Community Impact

- **Jobs and Tax Revenue:** The closure of Comanche 3 will result in the loss of 77 direct jobs, with an additional 334 indirect and induced jobs affected. The annual tax payment loss is estimated at \$31 million, with total projected losses of \$845 million by 2070.
- **Community Concerns:** A poll conducted by the Keating Group shows 63% of Pueblo residents are concerned about the closure, with specific worries about job loss (81%), tax loss (77%), and broader economic impacts (76%).

Health and Climate Benefits of Closing Comanche 3

The U.S. Environmental Protection Agency (EPA) provides a Toxics Release Inventory (TRI) that includes data on emissions from the Comanche plant. In 2019, the plant released over two million pounds of toxic chemicals, making it a significant source of pollution in the Pueblo area.

Moreover, EPA data shows that in 2022, Comanche units emitted 2,688.9 tons of sulfur dioxide (SO₂). SO₂ is a significant air pollutant that can contribute to respiratory problems and the formation of acid rain. The plant also released 3,364 tons of nitrogen oxides, which are known to contribute to the formation of smog and acid rain and can have harmful effects on respiratory health. Comanche units also emitted 6.6 million tons of carbon dioxide, a major greenhouse gas contributing to climate change.

	SO ₂	Nox	CO ₂
2022 Comanche emissions (tons)	2,688.9	3,364.0	6,642,119

Source: [EPA](#)

Pueblo experiences higher incidences of respiratory diseases and cancer compared to state averages, especially in communities of color located near the Comanche plant. In 2020, residents of the city visited emergency departments for asthma and chronic obstructive pulmonary disease at rates significantly higher than the state average.

HOSPITALIZATIONS & EMERGENCY DEPARTMENT VISITS

Age-adjusted hospitalization and emergency department rates, 2020

		County	State
Asthma	Emergency department	394.9	201.1
	Hospitalization	48.7	23.3
Carbon monoxide poisoning	Emergency department	7.3	5.5
	Hospitalization	2.7	0.8
COPD	Emergency department	415.2	233.9
	Hospitalization	132.2	54.8
Heart attack	Hospitalization	246.7	175.2
Heat-related illness	Emergency department	17.8	5.0
	Hospitalization	3.0	0.6

Rates are age-adjusted and are per 100,000 people per year

- Not statistically different from state rate
- Statistically significantly HIGHER than state rate

Source: [CDPHE](https://www.cdphe.com)

1 GHG Emissions

Comanche 3 is the largest source of carbon dioxide emissions among power plants in Colorado. In 2021, it emitted [4.2 million tons of carbon dioxide](#), making it the state's most significant emitter of this greenhouse gas. This places Comanche 3 at the top in terms of carbon dioxide emissions compared to other coal-fired power plants in Colorado, highlighting its substantial contribution to the state's overall greenhouse gas output.

The social cost of carbon is an economic metric used to quantify the monetary value of the long-term damage caused by emitting one ton of carbon dioxide into the atmosphere. This cost includes various factors such as health impacts, environmental degradation, and economic losses due to climate change. In Colorado, the social cost of carbon is set at not less than [\\$68 per short ton](#), as used by the Colorado Public Utilities Commission and the Air Quality Control Commission for economic analyses and regulatory decisions.

$$4.2 \text{ million tons} \times \$68/\text{ton} = \mathbf{\$285.6 \text{ million per year}}$$

Therefore, the social cost of carbon for Comanche 3's emissions is approximately \$285.6 million (assuming CO2 emission levels stay relatively constant). This figure represents the economic benefit of closing the plant, as it quantifies the avoided costs associated with the carbon emissions if the plant were to cease operations.

2. SO2 and Nox Emissions

We use EPA's COBRA tool to quantify the economic value of health benefits from improved air quality as a result of closing the Comanche 3 coal plant. The tool is designed to help users estimate the health and economic benefits of air quality improvements. COBRA provides estimates of the number of avoided health incidents, such as premature deaths, heart attacks, and respiratory illnesses, resulting from reductions in air pollution, and assigns monetary values to these health improvements, offering insights into the economic benefits of reducing air pollution.

Taking all these health improvements into account, avoided health costs as a result of the closure of Comanche 3 benefits Colorado between \$52 million and \$67 million a year. Pueblo county will benefit between \$4.6 million and \$5.6 million from avoided health costs.

Economic value of health benefits gained from improved air quality (discount rate 2%)

	\$ Total Health Benefits (low estimate)	\$ Total Health Benefits (high estimate)
Pueblo	\$4,600,000	\$5,600,000
Colorado	\$52,000,000	\$67,000,000

3 Toxins

According to the EPA, in 2022, the Comanche coal plant as a whole released over 2.2 million pounds of toxic chemicals in Pueblo, making it responsible for the lion's share of toxic chemical pollution in the area. Since the Comanche 3 unit is larger than units 1 and 2 combined, it's safe to assume that Comanche 3 emits a majority of the 2.2 million pounds of toxic pollution.

Replacement Options

Advanced Nuclear Plant

The [report](#) released in January 2024 by the Pueblo Innovative Energy Solutions Advisory Committee (PIESAC), addresses the impending closure of the Comanche 3 coal-fired power plant in Pueblo, Colorado. PIESAC recommends advanced nuclear energy as the most promising replacement option for Comanche 3. This recommendation is based on the potential of advanced nuclear to create 200 to 300 high-paying jobs with salaries ranging from \$60,000 to \$200,000 and generate annual tax payments of \$95.29 million. In comparison, a combined cycle gas plant with carbon capture would create only 20 to 25 jobs with annual tax payments of \$16.5 million.

Risks and Challenges of Nuclear Energy for Pueblo

1. Economic Challenges:

- **High Costs:** Nuclear power plants, including newer small modular reactors (SMRs), are extremely expensive to build and maintain. The proposed NuScale project in Idaho, for example, is expected to cost between \$1.3 to \$3.6 billion, funded partly by taxpayer dollars.

- **Delayed Benefits:** No commercial models of these new nuclear technologies have been built yet. Even optimistic schedules predict that pilot plants won't be operational until around 2030, making nuclear an impractical short-term solution for Pueblo's energy needs.

2. Environmental and Safety Risks:

- **Radioactive Waste:** Nuclear plants produce highly radioactive waste, including enriched uranium and plutonium, which need to be securely stored for thousands of years. This long-term storage problem remains unresolved in the U.S., with no national repository for high-level nuclear waste.
- **Accident Risks:** Nuclear power plants carry the risk of severe accidents, as evidenced by past incidents at Three Mile Island, Chernobyl, and Fukushima. Even with newer technologies, the potential for human error or technical failures presents significant dangers to surrounding communities.

3. Operational and Technical Issues:

- **Experimental Technology:** Claims about the immediate availability of safer, newer nuclear technologies are often overstated. Current proposals, such as those from NuScale, remain largely experimental and unproven at a commercial scale.
- **Cooling Requirements:** Even advanced reactors need significant cooling, often involving large amounts of water, which can be a logistical challenge and environmental burden. Air-cooled alternatives are still under regulatory review and are not yet proven.

4. Community and Regulatory Concerns:

- **Public Opposition:** Previous attempts to build nuclear plants in Pueblo have been rejected due to strong community opposition. The potential for increased accidents and long-term waste storage in their vicinity continues to be a major concern for residents.
- **Regulatory Hurdles:** Companies like NuScale are lobbying to reduce safety zones around nuclear plants, increasing potential risks to nearby communities if an accident occurs.

5. Comparative Inefficiency:

- **Renewable Alternatives:** Studies, such as those from Oregon State University, suggest that investing in solar energy on a small percentage of agricultural land could meet all

electricity demands while providing dual benefits, like additional income for farmers. Solar and wind power, combined with storage solutions, present more immediate, safer, and often cheaper alternatives to nuclear power.

Community Opinions and Concerns

Recent town hall meetings in Pueblo have revealed a diverse range of community opinions regarding the potential replacement of the retiring Comanche 3 coal plant with a nuclear facility. While an initial town hall showed strong opposition, with over 75% of speakers against the nuclear option, opinions were more evenly split at a subsequent meeting.

Supporters of nuclear energy highlighted its potential to provide highly skilled jobs and substantial tax benefits to the community, addressing the economic void left by the closure of Comanche 3. They emphasized that nuclear power could offer long-term career opportunities and economic stability for Pueblo residents.

However, significant concerns were raised by opponents. Many residents expressed worries about the safety and feasibility of nuclear power, citing risks such as potential terrorist targets and health hazards, including the possibility of increased cancer rates. There were also doubts about the economic boost promised by nuclear energy, with some arguing that it could come at the expense of public health and the local environment.

The debate also touched on the adequacy of nuclear waste management, with assurances from proponents about modern safety measures contrasted by skepticism from the public about long-term storage solutions. There was a call for unbiased assessments of nuclear power's viability, reflecting a desire for comprehensive and transparent decision-making.

Overall, the Pueblo community remains divided on the issue, with passionate arguments on both sides regarding the economic benefits, safety concerns, and environmental impacts of replacing Comanche 3 with a nuclear power plant. The ongoing dialogue highlights the complexity of the decision and the need for careful consideration of all viewpoints as the community plans its energy future.

Combined Cycle Gas Plant with Carbon Capture

Pros:

- Retains some employment, providing 20-25 jobs with salaries between \$80,000 and \$120,000.
- Contributes \$16.52 million in annual tax payments.
- Reduces CO2 emissions compared to traditional gas plants.

Cons:

- High operational costs and significant energy requirements for carbon capture.
- Limited reduction in overall emissions.
- Challenges in ensuring effective long-term CO2 storage.

Challenges and Examples of Nuclear Plant Issues

- **Cost Overruns and Delays:** Projects like the Vogtle nuclear plant in Georgia have faced significant cost overruns and delays, impacting their economic viability.
- **Decommissioning Costs:** The closure of plants such as the San Onofre Nuclear Generating Station in California has highlighted the high costs and long timelines associated with decommissioning.
- **Environmental and Safety Risks:** Incidents like the Fukushima disaster in Japan underscore the potential environmental and safety risks, leading to strong public opposition and regulatory hurdles.

CONCLUSION

The early retirement of Comanche 3 is a critical step toward achieving a cleaner and more sustainable energy future for Colorado. While nuclear energy presents potential economic benefits, its associated risks and challenges outweigh its advantages. Instead, the focus should be on expanding renewable energy infrastructure, which offers a safer, more reliable, and environmentally friendly alternative.