State of Nevada

Comprehensive Climate Analysis for Nevada (CCAN)

Prepared for
Nevada Division
of Environmental Protection

Prepared by
Sustainability Solutions Group

Executive Summary

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NEVADA DIVISION OF ENVIRONMENTAL PROTECTION

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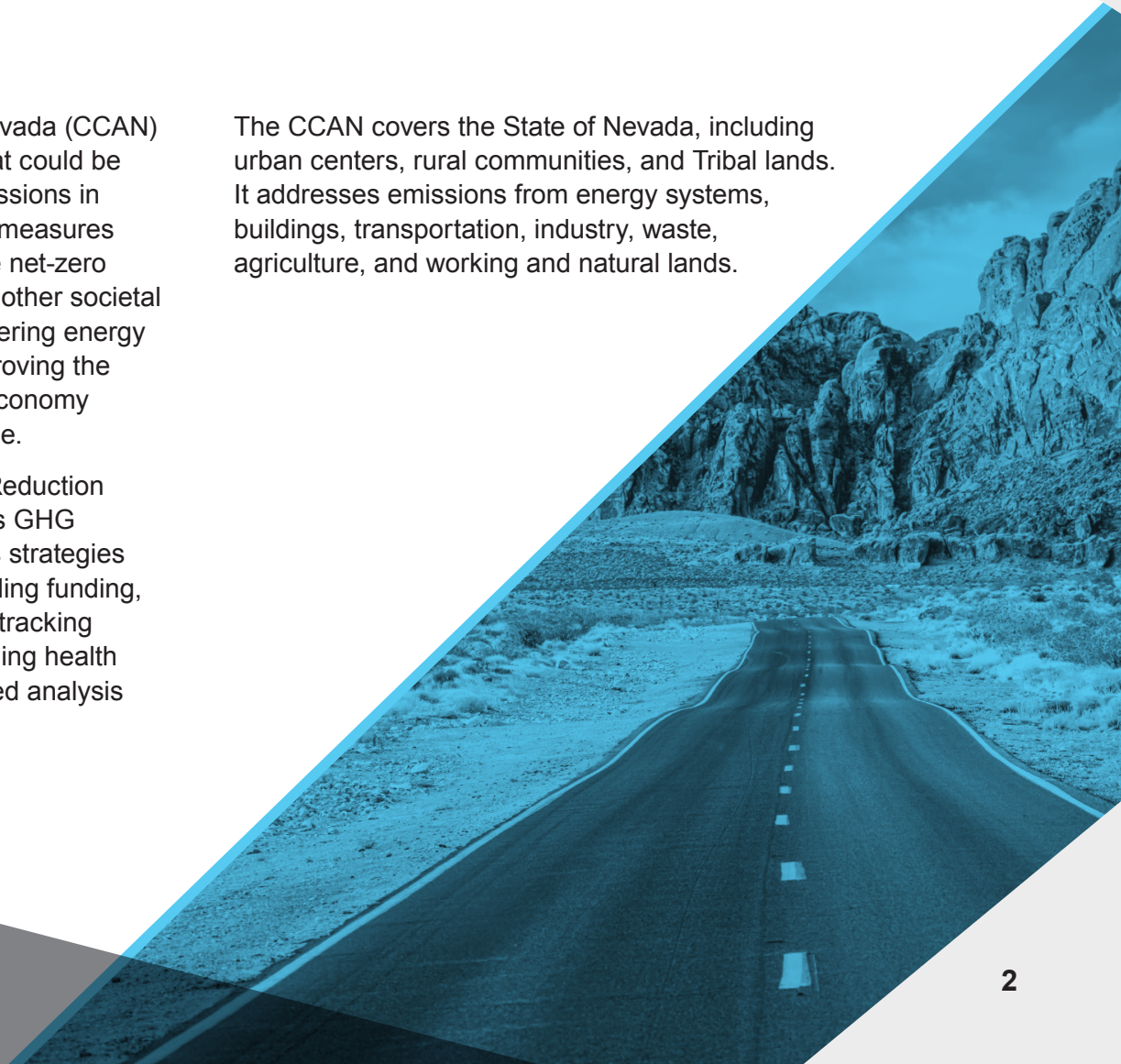
NEVADA GOVERNOR'S OFFICE OF ENERGY

E.1 Introduction

The Comprehensive Climate Analysis for Nevada (CCAN) studies potential low emissions pathways that could be implemented to reduce greenhouse gas emissions in Nevada. The results show examples of how measures could be implemented for Nevada to achieve net-zero emissions by 2050 while potentially creating other societal benefits, like creating thousands of jobs, lowering energy costs for families, reducing air pollution, improving the health of residents, and building a resilient economy through, among others, energy independence.

As required by the EPA`s Climate Pollution Reduction Grant (CPRG) program, the CCAN quantifies GHG reductions from specific measures, identifies strategies and considerations for implementation including funding, legal authority, workforce development, and tracking progress. It also assesses co-benefits including health impacts and cost savings, providing a focused analysis of energy poverty and at-risk communities.

The CCAN covers the State of Nevada, including urban centers, rural communities, and Tribal lands. It addresses emissions from energy systems, buildings, transportation, industry, waste, agriculture, and working and natural lands.



E2. The Approach

At the core of the CCAN is a baseline inventory of greenhouse gas emissions from Nevada for 2021 and projections that evaluate five hypothetical emissions reductions scenarios out to the year 2050. Based on the inventory and projections, further analysis was conducted to estimate the costs and benefits of the implementation of each measure, identifying what entities might play a key role if the measures were to be implemented, and evaluating what legal authority exists or may be needed to implement the measure, and potential funding sources.

The first two scenarios provide projections for the Business-as-Usual (BAU) and Business-as-Planned (BAP), that assume only the emissions reductions associated with programs or requirements that are already in effect, and those in effect and on the books to go into effect, respectively.

The remaining three scenarios project what the state-wide GHG emissions might look like in 2050 if a variety of emissions reduction measures were to be implemented. These scenarios are referred to as the Low Carbon (LC), Mixed Fuel (MF), and Community-Driven (CD).

Each scenario assumes a different strategy that could be used in implementing the emissions reduction measures to try to achieve the goals established in Nevada Revised Statutes (NRS) 445B.380 of net zero emissions by 2050. The LC scenario assumes ambitious timelines for emissions reductions that prioritizes achieving more rapid emissions reductions, the MF scenario prioritizes maintaining a more varied mixture of fuel and energy technologies, and the CD scenario prioritizes measures that more directly benefit communities, such as reducing household energy costs.

E2.1 Use and Limitations of the CCAN

The CCAN is not intended to be a roadmap of how greenhouse gas emissions should be reduced in Nevada, but rather as a resource to help inform implementation of measures at a variety of scales, whether it be through federal investments, state or local governmental programs; a business minimizing their environmental impacts, or an individual person making their home more energy efficient. However, it is important to note that there are some limitations to the CCAN. It is not practical to model and evaluate the impacts at every scale and account for all of the variables that would affect a specific implementation of the measure, so simplifying assumptions must be made to account for the more general case. For example, a specific implementation of a landfill gas capture and utilization system for a large landfill that serves 1 million people may be more cost effective than the general case, while it may be significantly less cost effective than the general case for a landfill that serves 5,000 people.

There may also be challenges not considered in this analysis that may affect the scalability or viability of any given measure or the achievable emissions reductions. For example, lack of availability of large-scale federal investments, technological limitations, or market constraints could delay or limit adoption of emissions reduction measures.

E3. The Pathways

E3.1 The Starting Point

The GHG inventory for Nevada in 2021 shows total emissions of 42 million metric tons ($mmtCO_2e$) (excluding sequestration), or 35 $mmtCO_2e$ (net total, including sequestration from natural lands). With 3.15 million residents, this equates to per capita emissions of 13.6 $mtCO_2e$—just below the national average of 14.8 metric tons.[1]

E3.2 Future Scenarios

Five scenarios were analyzed, including two reference scenarios, Business As Usual (BAU) and Business As Planned (BAP) and three low carbon scenarios, Low Carbon (LC), Mixed Fuel (MF) and Community Driven (CD). The transition towards cleaner energy generation and uses, an analysis of Nevada`s unique capabilities, and a community engagement process shaped the development of the low carbon scenarios.

Table E.1. The Scenarios

BAU Business-as-Usual	Continuation of current trends including population growth and economic growth with no additional policies. Limited efficiency improvements and modest growth in renewable energy.
BAP Business-as-Planned	Full implementation of current and on the books policies and programs.
LC The Low Carbon Scenario	An accelerated transition to a clean electricity grid, rapid deployment of net-zero building codes, aggressive building retrofits, widespread adoption of zero-emission vehicles, and deep decarbonization of industrial processes.
MF The Mixed Fuel Scenario	Increased reliance on alternative fuels like hydrogen and renewable natural gas, and a more gradual rollout of clean technologies across sectors.
CD The Community-Driven Scenario	Prioritizes broadening access to clean energy, expanding active and public transportation, and ensuring at-risk communities are the first to see improvements in air quality, mobility, and energy efficiency.

[1] "Data Page: Per capita CO_2 emissions", part of the following publication: Hannah Ritchie, Pablo Rosado, and Max Roser (2023) - "CO_2 and Greenhouse Gas Emissions". Data adapted from Global Carbon Project, Various sources. Retrieved from https://ourworldindata.org/grapher/co-emissions-per-capita [online resource]

In the BAU, GHG emissions plateau near 52 MMtCO_2e through 2050 as population growth offsets efficiency gains. The BAP scenario—which assumes full implementation of adopted renewable portfolio standards, federal fuel-efficiency standards, and municipal climate ordinances—yields an 11 percent reduction by 2050. With additional climate action measures, all three low carbon scenarios (LC, MF and CD) achieve emissions reductions of 90% over 2021 or more by 2050 (including sequestration), with the deepest overall reductions occurring in the LC scenario.

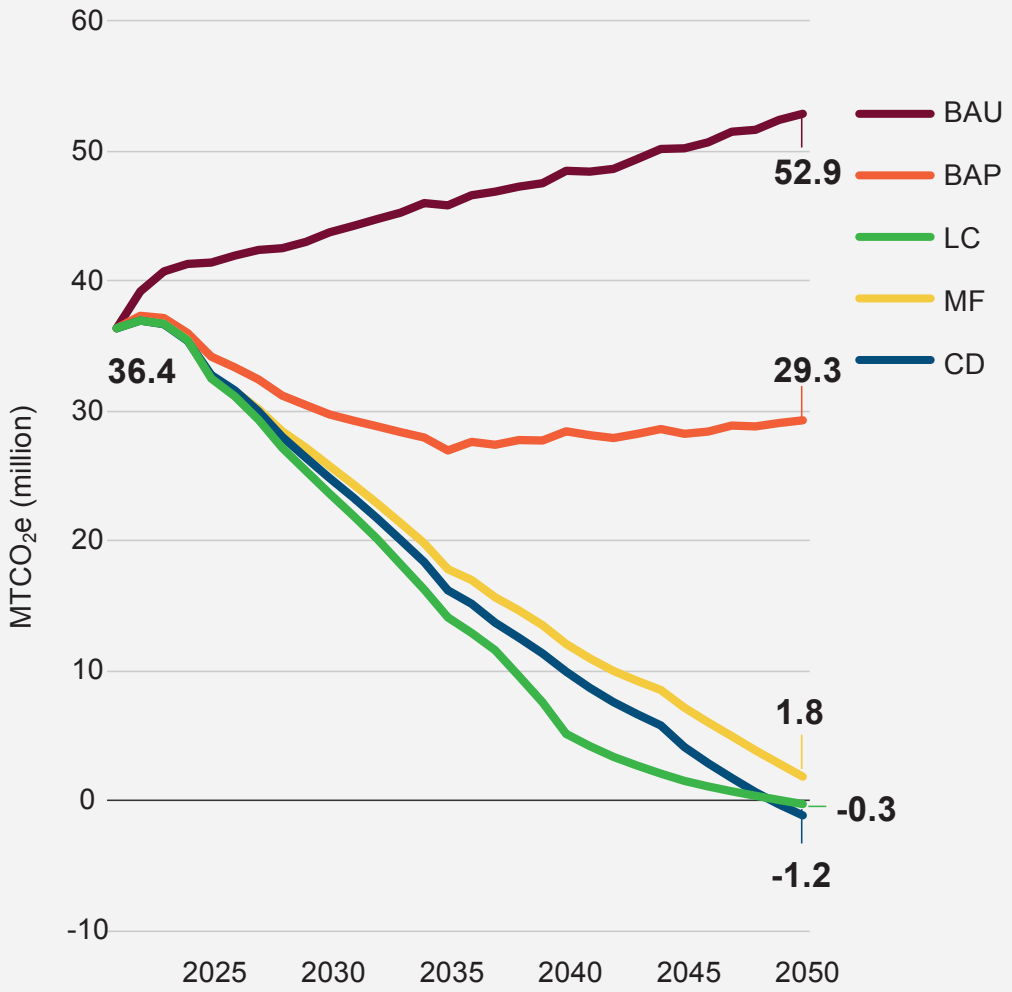
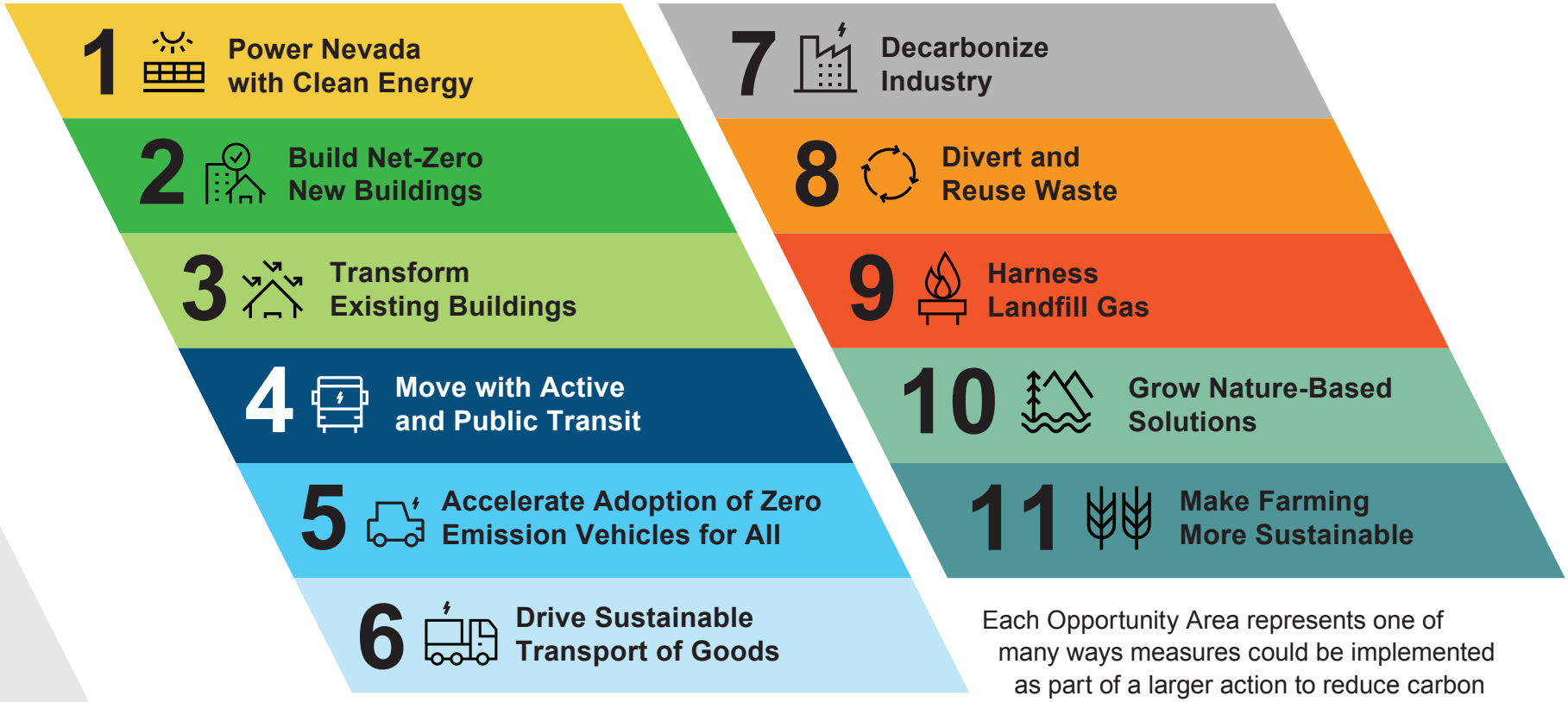


Figure E.1. Projected net GHG emissions in the BAU, BAP, LC, MF, and CD scenarios, 2021-2050 (including sequestration).

E3.3 The Opportunity Areas

The CCAN identifies dozens of emissions reduction measures that could be implemented individually. These emissions reduction measures could also be combined and implemented as part of a larger-scaled action addressing a wider range of emissions sources. For illustrative purposes, individual measures are organized into eleven "Opportunity Areas" that include related measures that could be implemented together to more holistically address key sources of emissions in Nevada. The eleven Opportunity Areas are:



Each Opportunity Area represents one of many ways measures could be implemented as part of a larger action to reduce carbon emissions, while delivering economic and health benefits.

E.4 The Impacts

E4.1 Co-benefits

Beyond reducing GHG emissions, the Low Carbon scenarios deliver other potential benefits to households, businesses and governments in Nevada, examples of which are highlighted in Table E2.

Table E.2. Benefits of the Low Carbon Scenarios

Benefit	Description
Improved health 	Air contaminants are reduced nearly to zero as a result of phasing out the combustion of fossil fuels. Air pollution damages the lungs, heart, brain, skin and other organs, and causes disease, disability[2] and death.[3] Air pollution from fossil fuels has been linked to acute bronchitis in children; asthma and other respiratory illnesses; heart disease; stroke; and an increased risk of cancer, and potentially to the development of neurological disorders, including Parkinson's disease, Alzheimer's disease and other dementias;[4], among other impacts.[5] Indoor air quality is also improved as a result of the building retrofits and the electrification of appliances with similar benefits.[6]

2 Gao, Jiaqi, Carlos F. Mendes de Leon, Boya Zhang, Jennifer Weuve, Kenneth M. Langa, Jennifer D'Souza, Adam Szpiro et al. "Long-term air pollution exposure and incident physical disability in older US adults: a cohort study." The Lancet Healthy Longevity 5, no. 10 (2024).

3 Buonocore, J. J., Reka, S., Y., D., Chang, C., Roy, A., Thompson, T., ... & Arunachalam, S. (2023). Air pollution and health impacts of oil & gas production in the United States. Environmental Research: Health, 1(2), 021006.

4 Kalenik, Sebastian, Agnieszka Zaczek, and Aleksandra Rodacka. "Air pollution-induced neurotoxicity: the relationship between air pollution, epigenetic changes, and neurological disorders." International Journal of Molecular Sciences 26, no. 7 (2025): 3402.

5 Manisalidis, Ioannis, Elisavet Stavropoulou, Agathangelos Stavropoulos, and Eugenia Bezirtzoglou. "Environmental and health impacts of air pollution: a review." Frontiers in public health 8 (2020): 14.

6 Nassikas, N. J., McCormack, M. C., Ewart, G..almes, J. R., Bond, T. C., Brigham, E., ... & Kipen, H. M. (2024). Indoor air sources of outdoor air pollution: health consequences, policy, and recommendations: an official American Thoracic Society workshop report. Annals of the American Thoracic Society, 21(3), 365-376.

Table E2. Benefits of the Low Carbon Scenarios (continued)

Benefit	Description
Increased affordability 	Household costs associated with travel and energy are expected to decrease by 70% between 2021 and 2050. This translates into a reduction from an average of $6,814 in annual household expenses 2021 to $3,700 in 2035 to $1,800 by 2050. These decreases are the result of more efficient equipment. Decreasing energy costs is critical to addressing energy poverty
Increased resilience 	The measures reduce exposure to extreme heat by mitigating the heat island effect and better protecting people in their homes by improving the thermal envelope and ensuring universal access to air conditioning. The energy system as a whole is potentially more resilient to fuel-price volatility and extreme weather events as generation is more geographically distributed and localized.
Job opportunities 	The measures in the low carbon scenarios require capital investments, which stimulate jobs across a range of sectors, averaging between 4,400 and 5,500 each year. Some of these jobs are highly skilled, while others are broadly accessible in activities such as building retrofits.

E4.2 Economic Impacts

Of the three scenarios, the LC scenario delivers the greatest public benefit, in terms of avoided energy costs and avoided climate damages, with a net benefit of just over $40 billion over the 25 year period (present value). The average annual investment (CAPEX) ranges from $5.4 to $5.8 billion per year (undiscounted); this is equivalent to 2.1-2.2% of Nevada's 2024 GDP.[7] The investments result in average annual energy savings of between $3.4 billion (CD scenario) and $4.4 billion (LC scenario), excluding climate damages.

[7] In 2024, Nevada's GDP was $261 billion. Federal Reserve Bank of St. Louis, 2025, Gross Domestic Product: All Industry Total in Nevada. https://fred.stlouisfed.org/series/NVNGSP

E4.3 A Role for Everyone

While the CCAN identifies “Opportunity Areas”, emissions can be reduced at any scale, from large statewide changes, to the changes of a single individual. Even small actions can make a big difference. Below are actions that could be implemented across a wide range of scales.

- **State & Local Government:** Align energy and land-use policies, building codes and transportation investments with CCAN Opportunity Areas.
- **Utilities & Regulators:** Accelerate transmission upgrades and integrated resource planning for 100 percent clean power.
- **Banks & Investors:** Provide financing mechanisms and pool investments for economies of scale.
- **Tribal Nations:** Lead renewable development on Tribal lands and co-manage sagebrush restoration.
- **Industry & Labor:** Upskill workers for geothermal drilling, heat-pump installation and energy-efficient construction. Advance efforts to decarbonize industrial processes.
- **Residents & Businesses:** Adopt energy-efficient technologies, shift travel choices, and participate in community solar programs.

E4.4 Conclusion

The CCAN can help inform potential pathways for a clean energy future that builds a healthier, more prosperous, and energy-independent Nevada. The CCAN provides examples of how Nevada's adopted clean energy goals could be achieved and how it could transform the State from an importer of energy to a clean energy exporter. The scenarios show potential pathways that with significant initial investments could achieve net-zero emissions in Nevada by 2050 while creating thousands of jobs, reducing energy costs, and increasing the quality of life for all Nevadans; however, there may be challenges not considered in this analysis that may affect the scalability or viability of any given measure or the achievable emissions reductions. For example, lack of availability of large-scale federal investments, technological limitations, or market constraints could delay or limit adoption of emissions reduction measures. The CCAN represents a culmination of years of technical development and stakeholder engagement led by NDEP, in order to provide valuable information on the costs and benefits of measures aimed to reduce emissions in Nevada, including benefits in human health and economic impacts.

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