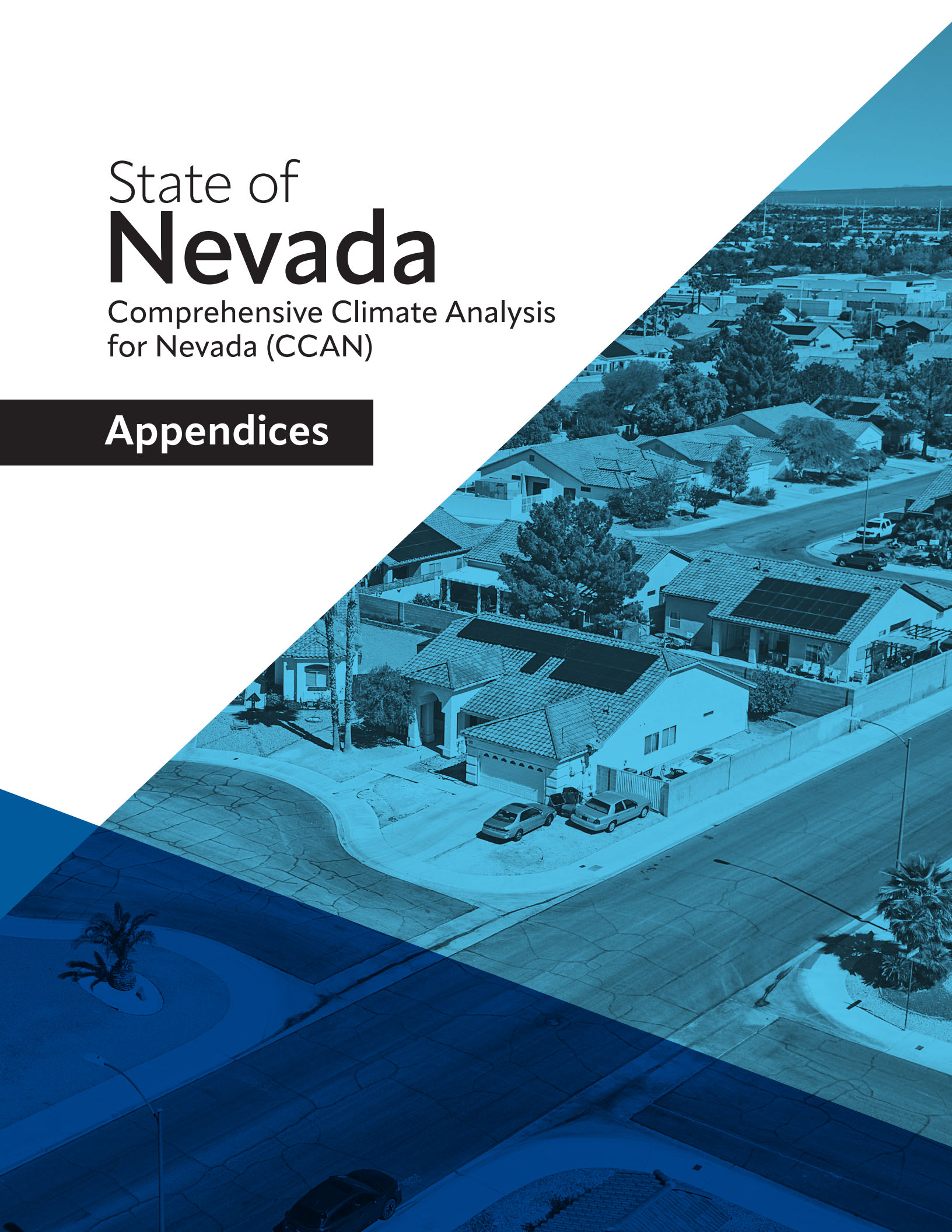
State of Nevada

Comprehensive Climate Analysis for Nevada (CCAN)

Appendices



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Appendix A: Glossary

Active transportation/travel: Trips made by physically active means such as walking, biking, using assistive mobility devices such as scooters and wheelchairs, skateboarding and running.

Base year: The starting year for energy or emissions projections, 2021.

Biomethane: A mixture of methane and other gases produced by the anaerobic digestion of organic matter that is processed and refined to a similar quality as fossil gas.

Business-as-Usual (BAU) Scenario: A scenario illustrating energy use and GHG emissions if no plans, policies, programs or projects are implemented.

Business-as-Planned (BAP) Scenario: A scenario illustrating energy use and GHG emissions in the case that plans, policies, programs and projects that have already been passed or are currently underway continue to be implemented.

Carbon budget: Either (a) a quantitative analysis of how much carbon the world has left to emit before exceeding our desired global temperature increases, or (b) an allocation of GHG emissions for a specific organization for a specific time period.

Carbon-free or emissions-free grid: An electricity grid where the power that is generated and distributed comes from only renewable and/or non-emitting sources.

Carbon sequestration: The process of storing carbon in a carbon pool.

Commercial Buildings Energy Consumption Survey (CBECS): Developed by the EIA, the CBECS provides information on the estimated 5.9 million commercial buildings in the U.S., including the number of workers, ownership and occupancy, structural characteristics, energy sources and uses, and other energy-related features (2018 data at the time of writing, most recent dataset available).

Combined heat and power (CHP): The simultaneous production of two or more useful forms of energy, typically electricity and heat, by a single device (also known as co-generation).

Consumption-based emissions: Emissions from the volume of goods consumed by a population.

CO_2e (carbon dioxide equivalents): A single unit of measurement that allows for the impact of releasing different greenhouse gases into the atmosphere to be evaluated on a common basis. Carbon dioxide equivalents are calculated using Global Warming Potential factors that represent the impact of each greenhouse gas type, such as methane (CH_4) and nitrous oxide (N_2O), relative to that of carbon dioxide.

Decarbonize: To eliminate the release of greenhouse gases from a process or system into the atmosphere. This includes swapping out any fossil fuel sources for renewable energy.

Energy Information Administration (EIA): An agency of the U.S. federal government that collects, analyzes and disseminates information on energy and its interaction with the economy and the environment, including production, stocks, demand, imports, exports and prices.

Environmental Protection Agency (EPA): An agency of the U.S. federal government that studies environmental issues, develops and enforces regulations to protect the environment, and provides grants to various entities to promote environmental conservation and human health.

Geographic information system (GIS): A computer program or system that analyzes and displays geographic data.

Greenhouse gases (GHGs): Gases that trap heat in the atmosphere by continuously absorbing and emitting radiation, causing a greenhouse effect. The main GHGs are water vapor, carbon dioxide, methane, nitrous oxide and ozone.

GHG inventory: An inventory of GHG emissions for a given time period and geography.

Heating degree day (HDD): A measurement designed to quantify the demand for energy needed to heat a building. It consists of the number of degrees that a given day's average temperature is below 18ºC (64°F), thus requiring heating.

Heat pump: A highly efficient heating and cooling system that transfers thermal energy from the ground or air to warm a building during winter and cool it during the summer.

Intergovernmental Panel on Climate Change (IPCC): A United Nations body that assesses the science related to climate change via regular reports and analyses about the state of scientific, technical and socio-economic knowledge on climate change, its impacts and future risks, and options for reducing the rate at which climate change is taking place.

Marginal abatement cost curve (MACC): A graph showing the relative economic costs or savings of emission abatement measures, in units of USD/tCO_2e over time.

megaton (mt): 1,000,000 metric tons

National Renewable Energy Laboratory (NREL): The National Renewable Energy Laboratory is a federally funded research and development center sponsored by the U.S. Department of Energy and operated by the Alliance for Sustainable Energy, specializing in the research and development of renewable energy, energy efficiency, energy systems integration and sustainable transportation.

Natural gas: A naturally occurring mix of gaseous hydrocarbons that consists primarily of methane.

Net zero: A balance between the amount of greenhouse gases released and the amount taken out of the atmosphere.

Net-zero building: A building that is highly energy-efficient and produces on-site renewable energy or procures carbon-free and/or renewable energy in an amount sufficient to offset the

annual carbon emissions associated with its operations, or simply eliminates carbon emissions altogether.

Net-zero emissions: GHG emissions produced by human activity are balanced with an equivalent amount of GHG emissions removal from the atmosphere.

Person-year: A unit of measurement for the amount of work done by an individual throughout the entire year, expressed in the number of hours. To calculate a person-year, the number of hours worked by an individual during the week is multiplied by 52.

Renewable energy: A naturally occurring energy source that is not finite or exhaustible. It includes sources such as sunlight, wind and geothermal heat.

Residential Energy Consumption Survey (RECS): Developed by the EIA, the RECS provides an estimate of residential energy costs and usage for heating, cooling, appliances and other end uses. It was developed using a nationally representative sample of housing units and their energy characteristics combined with data from energy suppliers.

State Energy Data System (SEDS): Developed by the EIA, SEDS provides comprehensive statistics regarding the consumption, production, prices and expenditures of energy for each state and for the U.S. as a whole.

Scenario: A plausible description of how the future may develop based on a coherent and internally consistent set of assumptions about key driving forces (e.g., rate of technological change, prices) and relationships. Scenarios are neither predictions nor forecasts but are used to provide a view of the implications of developments and measures.

Social cost of carbon: A dollar estimate of the economic damage that would result from emitting one ton of carbon dioxide into the atmosphere.

Vehicle miles traveled (VMT): Distance traveled by vehicles within a defined region over a specified time period.

Zero-emissions vehicle (ZEV): A vehicle that does not produce tailpipe emissions or other pollutants from the onboard source of power.

Appendix B: Data, Methods, and Assumptions Manual

B.1 Accounting and Reporting Principles

THe greenhouse gas (GHG) inventory development and scenario modeling approach is based on accounting methods from the Intergovernmental Panel on Climate Change (IPCC).[1] The GHG inventory includes detailed calculations of carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) emissions and high-level calculations of perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), sulfur hexafluoride (SF_6) and nitrogen trifluoride (NF_3) for eight sectors:

1. Transportation
2. Energy
3. Buildings
4. Industry
5. Waste
6. Agriculture
7. Fugitive
8. Natural and working lands

Consistent with reporting standards, the following principles for GHG accounting and reporting have been applied:

- **Relevance:** The reported GHG emissions appropriately reflect emissions occurring as a result of activities and consumption within the state of Nevada. The inventory is meant to serve the decision-making needs of the Government Agencies, Commissions, and Offices, taking into consideration relevant local, state, and

[1] IPCC 2019, 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Calvo Buendia, E., Tanabe, K., Kranjc, A., Baasansuren, J., Fukuda, M., Ngarize, S., Osako, A., Pyrozhenko, Y. Shermanau, P. and Federici, S. (eds). Published: IPCC, Switzerland.

national regulations. Relevance applies when selecting data sources and determining and prioritizing data collection improvements.

- **Completeness:** All emission sources within the inventory boundary are accounted for, and any exclusions of sources are justified and explained.
- **Consistency:** Emissions calculations are consistent in their approach, boundaries and methodology.
- **Transparency:** Activity data, emissions sources, emissions factors and accounting methodologies require adequate documentation and disclosure to enable verification.
- **Accuracy:** The calculation of GHG emissions should not systematically overstate or understate actual GHG emissions and should be accurate enough to give decision-makers and the public reasonable assurance regarding the integrity of the reported information. Uncertainties in the quantification process should be reduced to the extent possible and practical.

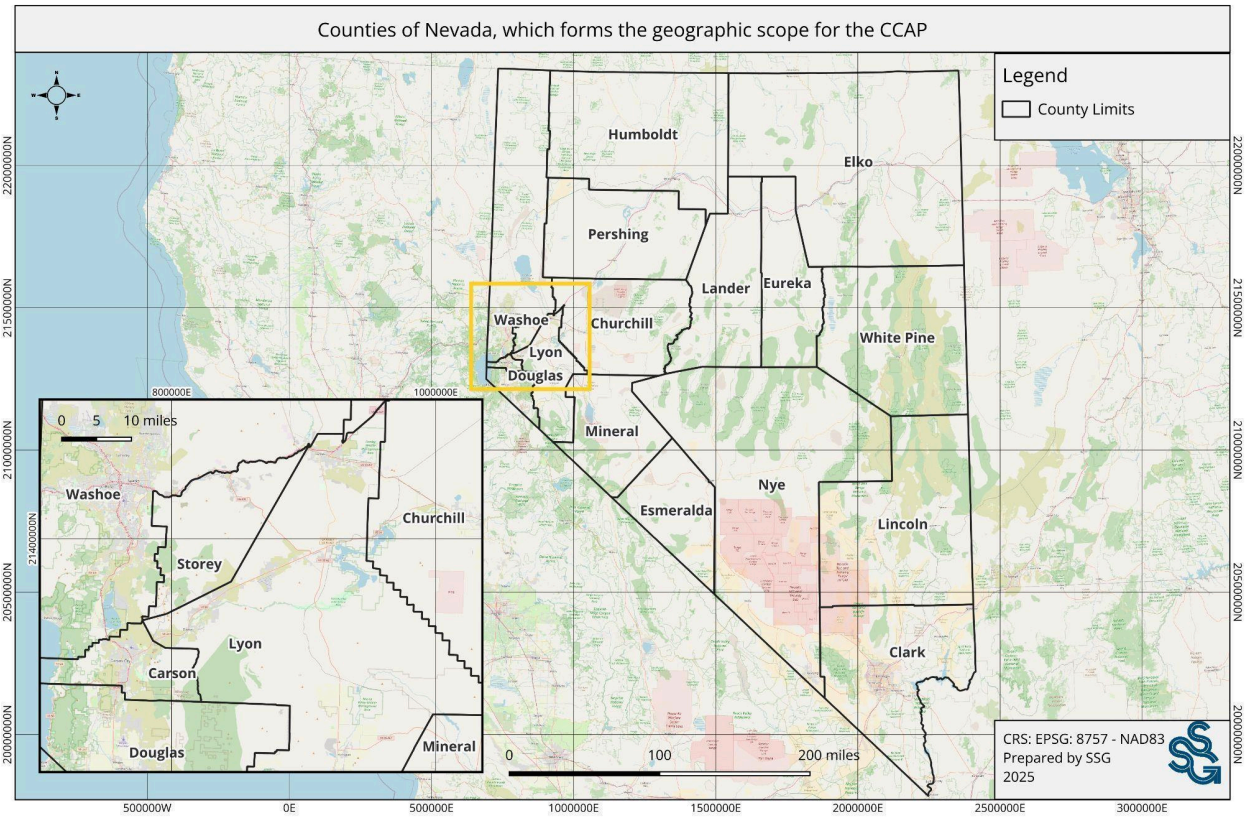
B.2 Scope

B.2.1 Geographic Boundary

Energy and emissions inventories and modeling for the project is broken down across the state of Nevada, encompassing all 17 counties: Carson City, Churchill, Clark, Douglas, Elko, Esmeralda, Eureka, Humboldt, Lander, Lincoln, Lyon, Mineral, Nye, Pershing, Storey, Washoe, and White Pine. For analysis purposes, the state is divided into 149 zones, created by grouping census tracts, with greater spatial detail in Clark and Washoe counties to reflect available transportation and land use data. Figure B.1 illustrates the geographic boundary of the study area and the location of each county.

The modeled land-use and density targets are aligned with Nevada's statewide and regional planning goals for climate action by 2030 and 2050. While county boundaries are fixed, population and development pressures, particularly in rapidly growing areas such as Clark and Washoe counties, are expected to drive significant changes in land use and urban density. The model estimates changes in land cover across the 149 zones, accounting for both urban expansion and infill development, as well as the associated impacts on carbon sequestration and emissions resulting from these land cover transformations.

Figure B.1. Geographic scope and sub-scopes (counties) of this study.



B.2.2 Time Frame of Assessment

The modeling time frame is 2021 to 2050. The year 2021 is the base year, as it is the most recent year for which most of the required datasets have been updated. Data from the 2019 American Community Survey (five-year), the 2018 CEBCS and the 2020 Census is also used. Model calibration for the base year uses as much locally observed data as possible, supplemented by data collected at the federal levels.

B.2.3 Energy and Emissions Structure

Energy

The total energy consumption for the state is defined as the sum of the following aspects:

$$Energy_{State} = Energy_{Transport} + Energy_{Buildings} + Energy_{Industry} + Energy_{Agriculture} + Energy_{Waste}$$

Where:

$Energy_{Transport}$ is the movement of goods and people.

$Energy_{Buildings}$ is the use of energy to provide services such as heating and cooling and other stationary energy use in buildings.

$Energy_{Industry}$ is the use of energy in industrial processes.

$Energy_{Agriculture}$is energy used to in the agricultural sector

$Energy_{Waste}$ is energy used to in the waste sector

A detailed review of the method for calculating energy in these sectors is found in subsequent sections of this document. Note that this is one view of the sectors in the model and other views are possible.

GHG Emissions

GHG emissions from anthropogenic activities within the state are defined as the sum of all in-scope emissions sources:

$$GHG_{State} = GHG_{Transport} + GHG_{Buildings} + GHG_{EnergyGen} + GHG_{Waste\&Wastewater} + GHG_{Agriculture}$$

Where:

$GHG_{Transport}$ are emissions generated by the movement of goods and people.

$GHG_{Buildings}$ are emissions generated by energy use (lighting, appliances, heating, cooling, etc.) in buildings (residential and commercial).

$GHG_{EnergyGen}$ are emissions generated by steam and electricity generation.

$GHG_{Waste\&Wastewater}$ are emissions generated by solid and liquid waste.

$GHG_{Agriculture}$ are emissions generated by food production (i.e., emissions from cows, fertilization, operational energy use, etc.). They do not include sequestration from agriculture or emissions from tilling.

Separately, the net contribution of natural and working lands to the state's GHG emissions, including the amount of carbon they sequester, are also calculated. These types of emissions and sequestrations are excluded from the previous sum because they are biogenic rather than anthropogenic in nature and are not part of the IPCC emissions accounting framework.

$$GHG_{NetSequestration} = GHG_{WorkingLands} + GHG_{NaturalLands}$$

Where:

$GHG_{WorkingLands}$ are emissions generated by forested and similar types of land that are actively managed by humans.

$GHG_{NaturalLands}$ are emissions generated by the natural and wild lands, which are subject to relatively little human intervention.

Deducting the net sequestration from natural and working lands from total GHG emissions for the state provides the overall total of state's GHG emissions.

$$GHG_{Total} = GHG_{State} - GHG_{NetSequestration}$$

B.2.4 Emissions Scope

The GHG emissions included in the model are derived from activities occurring in various sectors, as shown in Table B.1. GHG emissions included for each sector come from sources located within the state boundary, including those occurring from the use of grid-supplied electricity, heat, steam and cooling, as well as GHG emissions that occur outside the state boundary as a result of activities taking place within the boundary.

Table B.1. Sectors included in the GHG emissions scope and their definitions.

Emissions From Energy Use	
Sector	**Definition**
Transportation ($GHG_{Transport}$)	Emissions from the use of cars, trucks, boats, aviation, and non-road vehicles.
Electricity generation ($GHG_{EnergyGen}$)	Emissions from the generation and transmission of electricity used within the state, including that produced outside of the state.
Residential (part of $GHG_{Buildings}$)	Emissions from the use of lighting, appliances, heating, and cooling in buildings used as dwellings.
Commercial (part of $GHG_{Buildings}$)	Emissions from the use of lighting, appliances, heating, and cooling in buildings not used as dwellings.
Industrial ($GHG_{Industrial}$)	Emissions from on-site stationary combustion and industrial processes that emit GHGs (such as cement manufacturing or iron and steel production).
Fugitive ($GHG_{Fugitive}$)	Emissions that leak from equipment such as pipelines, valves, pumps, flanges, compressors, and other process equipment.

Other Emissions (Non-Energy Use)	
Sector	**Definition**
Agriculture ($GHG_{Agriculture}$)	Emissions from agricultural activities such as managing soils, livestock and livestock-related waste, and methane and nitrous oxide emissions from the burning of agricultural residual waste. Emissions from fuel combusted for farm equipment use, such as for the operation of tractors, are included within the transportation sector emissions.
Natural and working lands ($GHG_{Sequestration}$)	GHG sequestration or emissions arising from changes in land use or land management of vegetated areas (e.g., forests, grasslands) or wetlands as a result of human activities."
Refrigerants, etc.	Emissions from refrigerants, aerosols and fire protection in all sectors (transportation, residential, commercial, industrial).
Solid waste and wastewater ($GHG_{Waste\&Wastewater}$)	Emissions from waste incineration, municipal solid waste and wastewater, and compost in the residential and commercial sectors, as well as industrial waste, industrial landfills, food processing wastewater, pulp and paper, and waste incineration in the industrial sector.

A detailed review of the method for calculating GHG in these sectors is found in subsequent sections of this document.

B.2.5 Global Warming Potential (GWPs)

Global warming potentials (GWPs) are based on the Fifth Assessment Report.[2]

Table B.2. GWP for each GHG used in the analysis

Greenhouse Gas	Formula	Fifth Assessment Report
Carbon dioxide	CO2	1
Methane	CH4	28
Nitrous oxide	N20	265
HFCS	HFC-134a	1 300
	HFC-143a	4 800
	HFC-125	3 170
	HFC-23	12 400
	HFC-32	677

[2] IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp.

Greenhouse Gas	Formula	Fifth Assessment Report
Sulphur hexafluoride	SF6	23 500
Nitrogen trifluoride	NF3	16 100

B.3 ScenaEnergy

ScenaEnergy is an energy, emissions and finance accounting tool developed by Sustainability Solutions Group (SSG) and whatIf? Technologies.[3] The model integrates fuels, sectors and land use in order to enable bottom-up accounting. Bottom-up accounting in energy and emissions modelling refers to a methodological approach that builds estimates of energy use and greenhouse gas (GHG) emissions by aggregating data at the level of individual technologies, processes, sectors, or facilities. This is in contrast to top-down approaches, which rely on macroeconomic indicators or aggregate energy statistics. which refers to deriving emissions from the primary. Aspects of energy supply and demand included are:

- Renewable resources
- Conventional fuels
- Energy-consuming technology stocks (e.g., vehicles, appliances, dwellings, buildings)
- All intermediate energy flows (e.g., electricity and heat)

Energy and GHG emissions values are derived from a series of connected stock-and-flow models, evolving based on current and future geographic and technology decisions/assumptions (e.g., electric vehicle uptake rates). A stock is a quantity of something that accumulates or is held at a particular point in time, for example the fleet of vehicles, or the population, while flows impact the change of stocks as new vehicles are added in the first case, or due to births and deaths and immigration and emigration in the second. The model accounts for physical flows (e.g., energy use, new vehicles by technology, vehicle miles traveled) and how these impact stocks (buildings, vehicles, heating equipment, etc.).

The model incorporates and adapts concepts from the system dynamics approach to complex systems analysis. System dynamics is a method which represents a system by

[3] SSG and whatIf? Technologies merged in 2021 and are now operating as Sustainability Solutions Group (SSG)

mathematically defining relationships between components of that system with non-linear relationships and feedback cycles.[4]

For any given year, the model traces the flows and transformations of energy from sources through energy currencies (e.g., gasoline, electricity, hydrogen) and end uses (e.g., personal vehicle use, space heating) to energy costs and GHG emissions. An energy balance is achieved by accounting for efficiencies, technology conversion and trading losses at each stage of the journey from source to end use.

Table B.3. Model characteristics.

Characteristic	Rationale
Integrated	The tool models and accounts for all energy and emissions in relevant sectors and captures relationships between sectors. The demand for energy services is modeled independently of the fuels and technologies that provide the energy services. This decoupling enables exploration of fuel-switching scenarios. Viable scenarios are established when energy demand and supply are balanced.
Scenario-based	Once calibrated with historical data, the model enables the creation of dozens of scenarios to explore different possible futures. Each scenario can consist of either one or a combination of policies, measures and strategies. Historical calibration ensures that scenario projections are rooted in observed data.
Spatial	The model includes spatial dimensions that can include as many zones (the smallest areas of geographic analysis) as deemed appropriate; in this case, they are zones (grouped census tracts) and counties . The spatial components can be integrated with geographic information systems (GIS), land-use projections and transportation modeling.
Sector-based	The model is designed to report emissions according to categories based on sectors (residential, industry, etc.).
Economic impacts	The model incorporates a high-level financial analysis of costs related to energy (expenditures on energy) and emissions (carbon pricing, social cost of carbon), as well as operating and capital costs for policies, strategies and measures. This allows for the generation of marginal abatement costs.

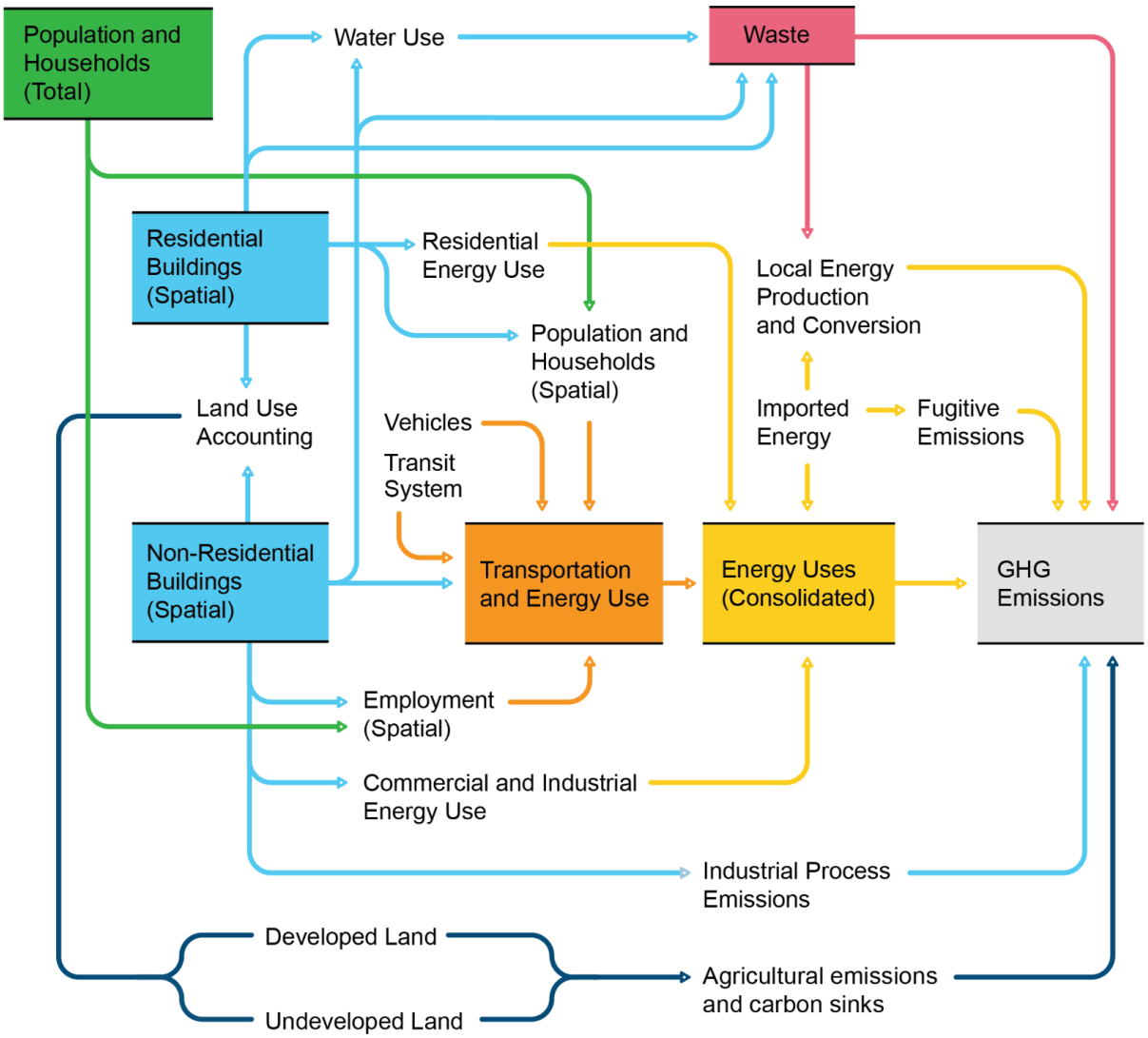
B.3.1 Model Structure

Figure B.2 is a high level schematic of the energy and emissions system represented in Scena. The major components of the model and the first level of their modeled relationships (or influences) are represented by the arrows. Additional relationships may be modeled by modifying inputs and assumptions — specified either directly by users or in an automated fashion by code or scripts running “on top of” the base model structure. Integrated modeling

[4] For a detailed overview of systems dynamics modelling, see:
MIT OpenCourseWare, 2020, System Dynamics: Systems Thinking and Modeling for a Complex World. Retrieved from: https://www.youtube.com/watch?app=desktop&v=o-Yp8A7BPE8

generates a total picture of the overall impact of inputs and assumptions, including the emissions or sequestration intensity of other inputs within the model.

Figure B.2 The sub-systems (boxes) and relationships (arrows) in the energy and emissions system analysed in ScenaEnergy/ScenaCommunity.



The model is spatially explicit. All buildings, transportation and land-use data are tracked within the model through a GIS platform and by varying degrees of spatial resolution. To divide the state into smaller configurations, the model incorporates data at the level of Nevada's 17 counties> his approach enables more accurate modeling of energy use and emissions at the regional level, accounting for the significant contrasts between densely populated urban counties such as Clark and Washoe, and sparsely populated rural counties across Nevada's arid and mountainous interior.

In any given year, various factors shape the picture of energy and emissions flows, including the population and the energy services it requires; commercial floorspace; energy production and trade; and technologies deployed to deliver energy services (service technologies) and to transform energy sources to currencies (harvesting technologies). The model is based on an explicit mathematical relationship between these factors — some contextual and some being part of the energy-consuming or energy-producing infrastructure — and the energy flow picture.

Some factors are modeled as stocks — counts of similar things, classified by various properties. For example, population is modeled as a stock of people classified by age and gender. Population change over time is projected by accounting for the natural aging process, inflows (births, immigration) and outflows (deaths, emigration). The fleet of personal-use vehicles — an example of a service technology — is modeled as a stock of vehicles classified by size, engine type and model year, with a similarly classified fuel consumption intensity. As with population, projecting change in the vehicle stock involves aging vehicles and accounting for major inflows (new vehicle sales) and outflows (vehicle discards). This stock-turnover approach is applied to other service technologies (e.g., furnaces, water heaters) and harvesting technologies (e.g., electricity generating capacity).

B.3.2 Energy and GHG Emissions Accounting

ScenaEnergy accounts for the energy flows through the model, as shown in Figure B.3.

Source fuels crossing the geographic boundary of the city are shown on the left. The four “final demand” sectors — residential, commercial, industrial and transportation — are shown towards the right. Some source fuels are consumed directly in the final demand sectors (e.g., natural gas used by furnaces for residential heating, gasoline used by personal vehicles for transportation). Other source fuels are converted to another energy carrier before consumption in the final demand sectors (e.g., solar energy converted to electricity via photovoltaic cells, natural gas combusted in heating plants and the resulting hot water distributed to end-use buildings via district energy networks). Finally, efficiencies of the various conversion points (end uses, local energy production) are estimated to split flows into either “useful” energy or conversion losses at the far right side of the diagram.

Figure B.3. Energy flow Sankey diagram showing main node groups.

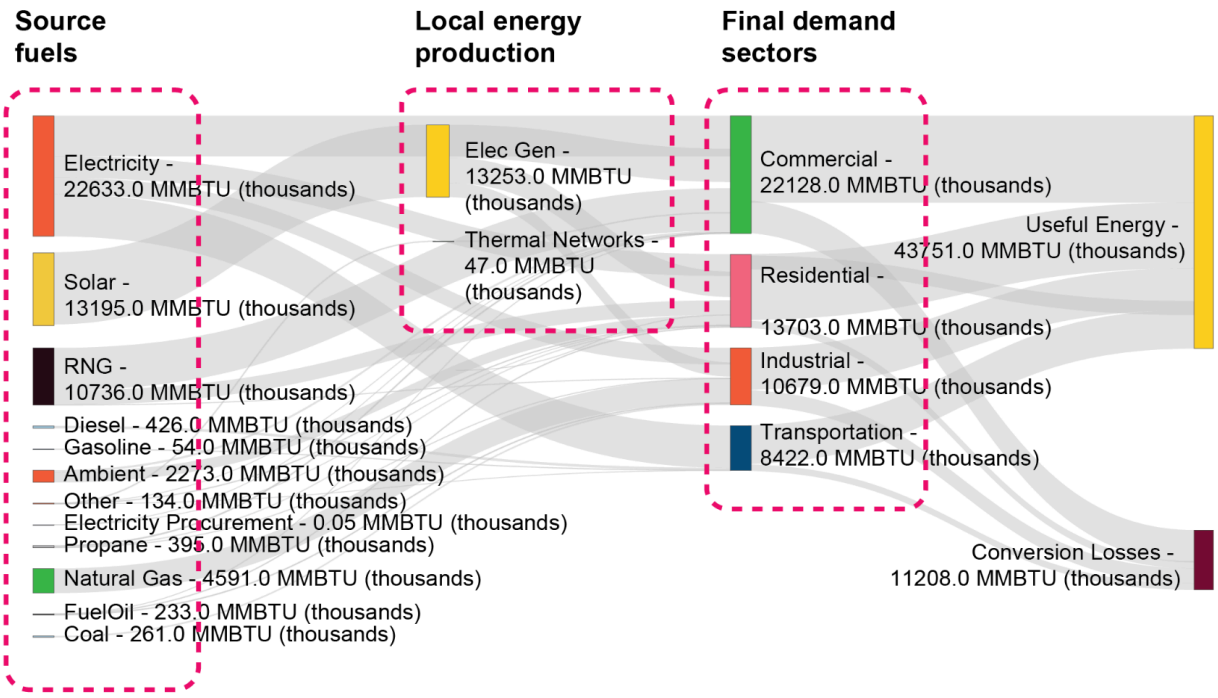


Figure B.3 shows the potential for ambiguity when energy is reported: Which energy flows circled are included? How does one prevent double counting? To address these ambiguities, ScenaEnergy generates separate reports on energy demand and supply.

Figure B.4 shows energy demand. Energy demand includes the energy flows just before the final demand sectors (left of the dotted red line). Where the demand sectors are supplied by local energy production nodes, the cut occurs after the local energy production and before demand.

Figure B.5 shows energy supply. Energy supply includes the energy flows just after the source fuel nodes (left of the dotted red line). Where the source fuels supply local energy production nodes, the cut occurs between the source fuels and local energy production.

Figure B.4. Illustration of the convention for energy consumption.

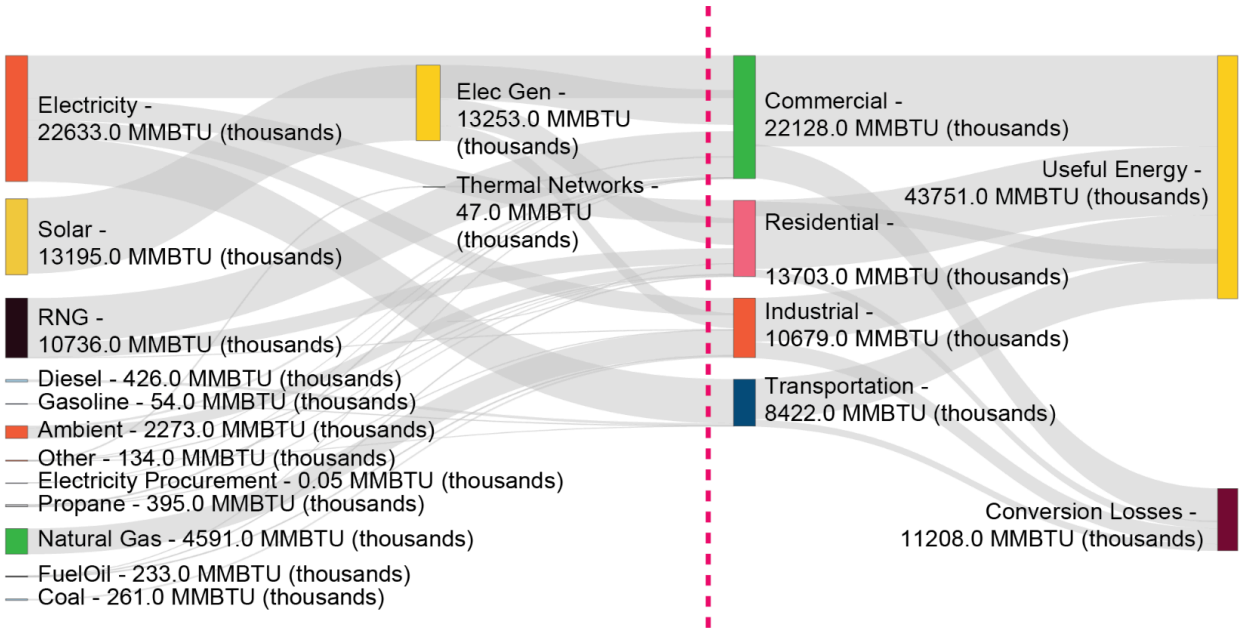
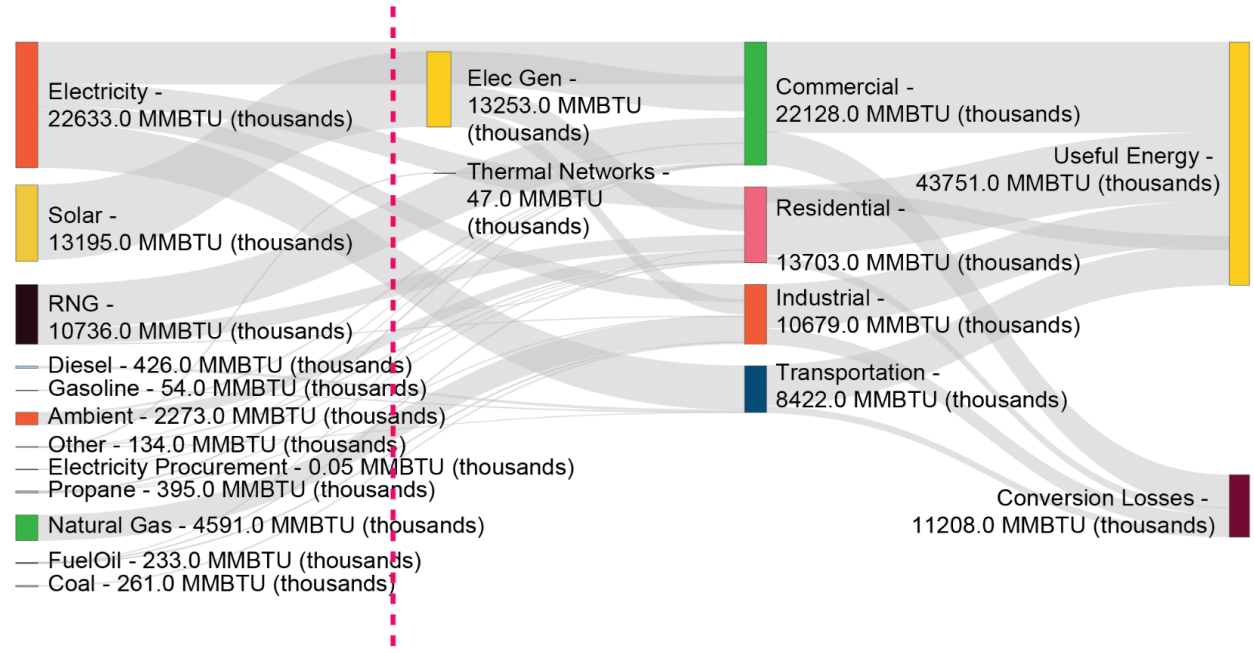


Figure B.5. Illustration of the convention for energy supply.



In the integrated ScenaEnergy energy and emissions accounting framework, GHG emissions are calculated after energy consumption is known.

B.3.3. Sub-Models and Local Context Calibration

The overall model operates based on the interactions within and between factors of various sub-models, as described in this section.

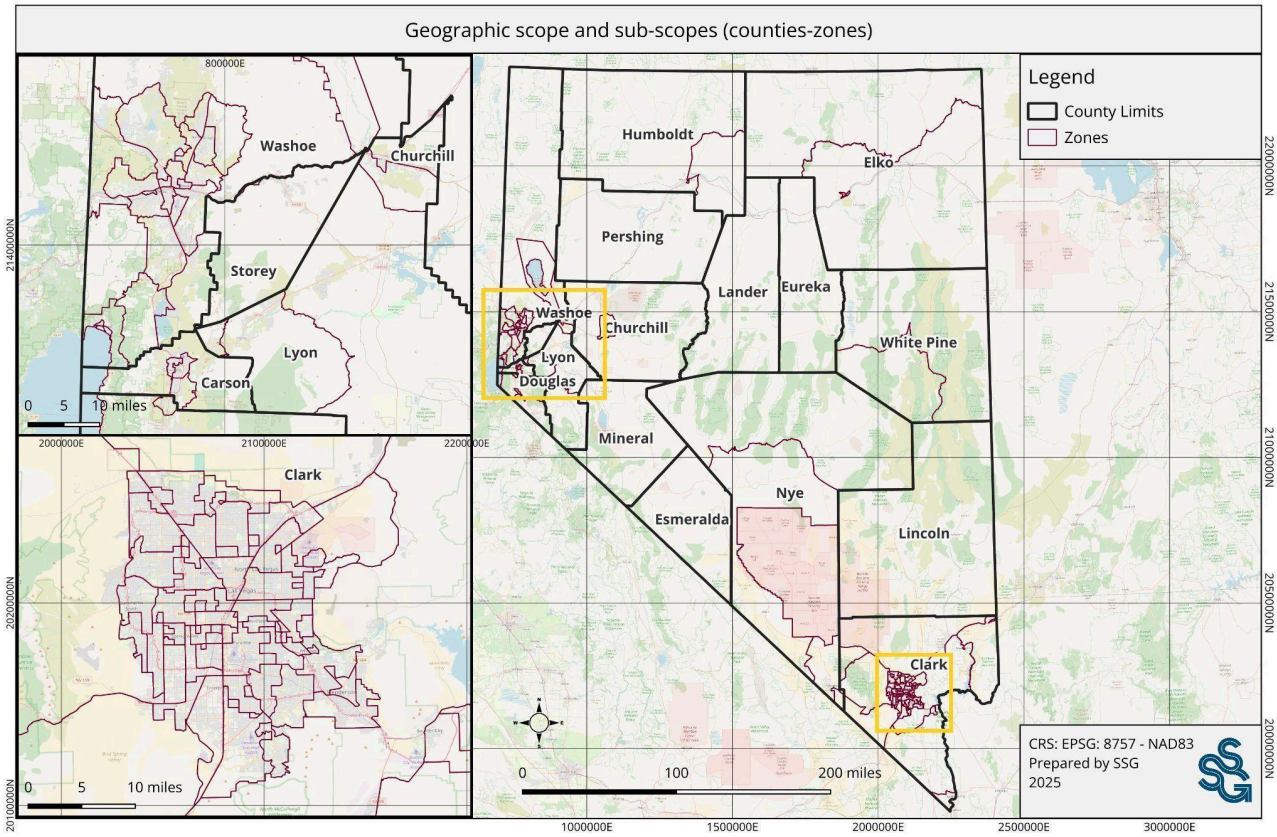
Data Request and Collection

Most data used to calibrate the model was supplied by Nevada state agencies, such as the Nevada Division of Environmental Protection, the State of Nevada Department of Taxation, and various County Assessor's Offices. Additional transportation data was sourced from regional entities like Nevada Department of Transportation.. Where gaps existed in the observed data, well-documented assumptions were made to supplement and ensure model completeness. These data inputs and assumptions are integrated into the model through the processes described below.

Zone System

The model is spatially explicit: population, employment, residential and non-residential floorspace are allocated and tracked spatially for each of Nevada's 17 counties (see Figure B.6). These elements drive stationary energy demand. The passenger transportation sub-model, which drives transportation energy demand, also operates within the same zone system.

Figure B.6. Zone system (Nevada counties and zones) used in modeling.

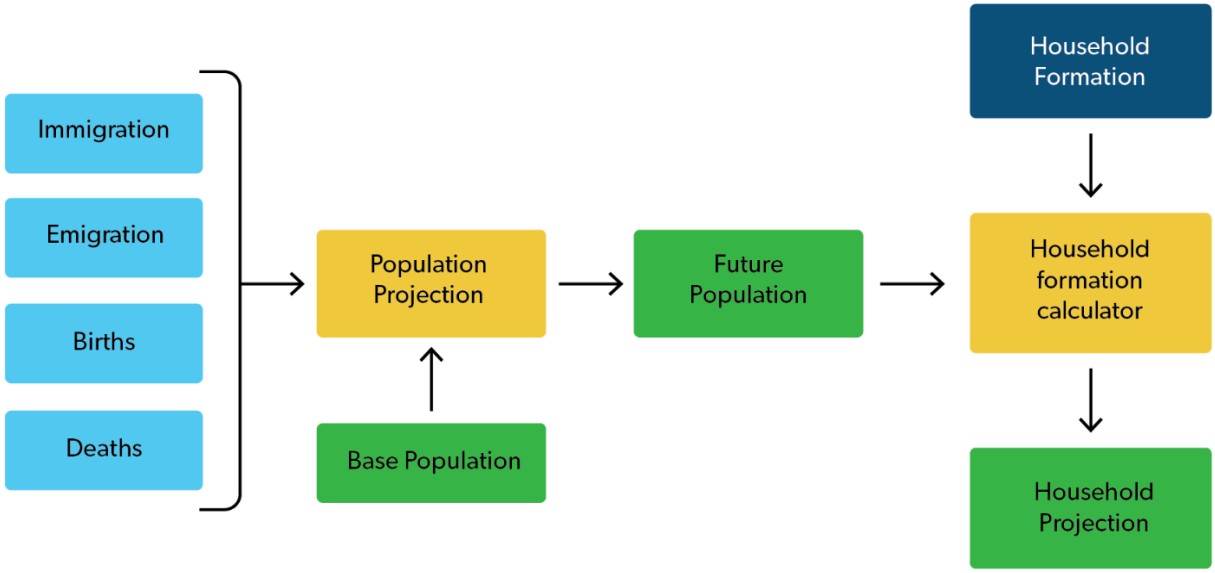


Population and Employment

How the Sub-Model Works

State wide population is modeled using the standard population cohort-survival method, disaggregated by single year of age and gender. It accounts for typical components of change: births, deaths, immigration and emigration. The age-structured population is important for analysis of demographic trends, generational differences and implications for shifting energy-use patterns. These numbers are calibrated against existing projections.

Figure B.7. Population and employment submodel design flow. Light blue rectangles represent flows, yellow rectangles represent model calculations, green rectangles represent stocks, and dark blue rectangle represent model parameters



Federal census population and employment data is spatially allocated to the residential (population) and non-residential (employment) buildings. This enables indicators, such as emissions per household, to be derived from the model and drives the Business-as-Usual (BAU) energy and emissions projections for buildings, transportation and waste.

An additional layer of model logic (not shown explicitly in Figure B.7) captures energy-related financial flows and employment impacts. Calculated financial flows include the capital, operating and maintenance costs of energy-consuming and energy-producing stocks, including fuel costs. The model also projects employment related to the construction of new buildings, retrofit activities and energy infrastructure; assesses the financial impact of implementing emissions reduction measures on businesses and households; and applies various local economic multipliers (depending on the geographic and economic variability of the calculation and anticipated output) to investments.

How the Sub-Model is Calibrated

The 2021 population is distributed to residential buildings in space, using initial assumptions about persons-per-unit (PPU) by dwelling type and adjusting them so that the total population in the model (which is driven by the number of residential units by type multiplied by PPU by type) matches the total population from census/regional data.

Employment in 2021 is spatially allocated to non-residential buildings, using two categories of assumptions: population-related services and employment are allocated to corresponding building floorspace (e.g., teachers to school floorspace) and floorspace-driven employment is applied using intensities (e.g., retail employees per square foot). As with population, the model adjusts these initial ratios so that the derived total employment matches total employment from the census and regional data.

Buildings

How the Sub-Model Works

Buildings are spatially located and classified using a detailed set of 12 building archetypes capturing footprint, height and type (single-family, duplex, semi-attached, row-housing, high-rise apartment , low-rise apartment, etc.) and year of construction. The archetypes are used to generate a “box” model that helps to estimate the floor area and energy use and simulates the impact of energy efficiency measures.

Using assumptions on thermal envelope performance and heating and cooling degree days, the model calculates space-conditioning energy demand independent of space heating or cooling technologies. First, the model multiplies the residential building floorspace area by an estimated thermal conductance (heat flow per unit of surface area per degree day) and the number of degree days (heating and cooling) to derive the energy transferred out of the building during winter months and into the building during summer months. The energy transferred through the building envelope, the solar gain through the building windows and the heat gains from equipment inside the building is netted from the space-conditioning load required to be provided by the heating and air-conditioning systems.

The space-conditioning demand is satisfied by stocks of energy service technologies, including heating systems, air conditioners and water heaters. These stocks are modeled with a stock-turnover approach, capturing equipment age, retirements and additions — exposing opportunities for efficiency gains and fuel-switching but also constraining the rate of technology adoption.

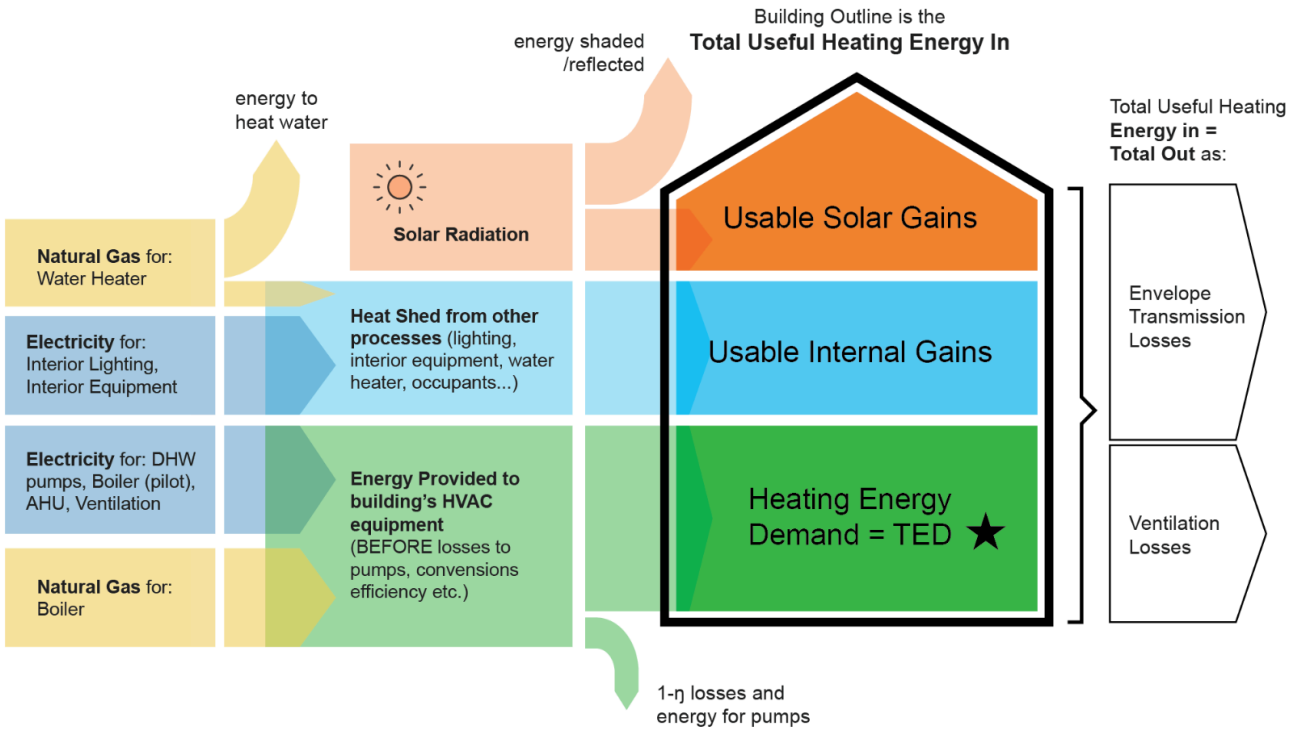
Residential building archetypes are also characterized by the number of dwelling units they contain, allowing the model to capture the energy effects of shared walls and the urban form and transportation implications of population density.

Non-residential buildings, commercial and otherwise,, are located in space and mapped to a set of 40+ archetypes. The floorspace of these archetypes varies by location. Non-residential floorspace generates demand for energy and water and provides an anchor point for locating employment of various types.

The model calculates the space-conditioning load for non-residential buildings as it does for residential buildings, with two distinctions: the thermal conductance parameter for

non-residential buildings is based on floor area instead of surface area, and it incorporates data from REPLICA, a proprietary provider of modeled and observed building and transportation data. Using assumptions for thermal envelope performance for each building type, the model calculates total energy demand for all buildings, independent of any space heating or cooling technology and fuel.

Figure B.8. A diagram showing the considerations in the model for energy and emissions related to buildings.



How the Sub-Model is Calibrated: Residential Buildings

For each county, building data (including building type, number of stories, number of units and year built, for residential, commercial and industrial buildings) was sourced from the Counties Assessor's Office and 2020 U.S. Census for residential buildings. Total floorspace area for each building type was calculated referencing building archetypes that are typical in each Nevada.

The initial estimates for thermal conductance and output energy use intensity by end use and equipment efficiency assumptions are regional averages by dwelling type from the Residential Energy Consumption Survey[5] (RECS) by the EIA for the Mountain Census

[5] U.S. Energy Information Administration. Residential Energy Consumption Survey (RECS), 2020. Available at: https://www.eia.gov/consumption/residential/data/2020/

Division. The assumed distribution of residential heat system types is derived from RECS for the Pacific Census Division, complemented by data from the ResStock[6] model by NREL specific to Nevada.

How the Sub-Model is Calibrated: Non-Residential Buildings

Starting values for output energy intensities and equipment efficiencies for non-residential end uses are taken from the 2018 Commercial Buildings Energy Consumption Survey[7] (CBECS) complemented by the EPA's Portfolio Manager Technical Reference[8] that provides energy use intensity by property type for some additional building types. All parameter estimates are further adjusted during the calibration process. The calibration target for non-residential building energy use is the observed commercial and industrial fuel consumption in the base year.

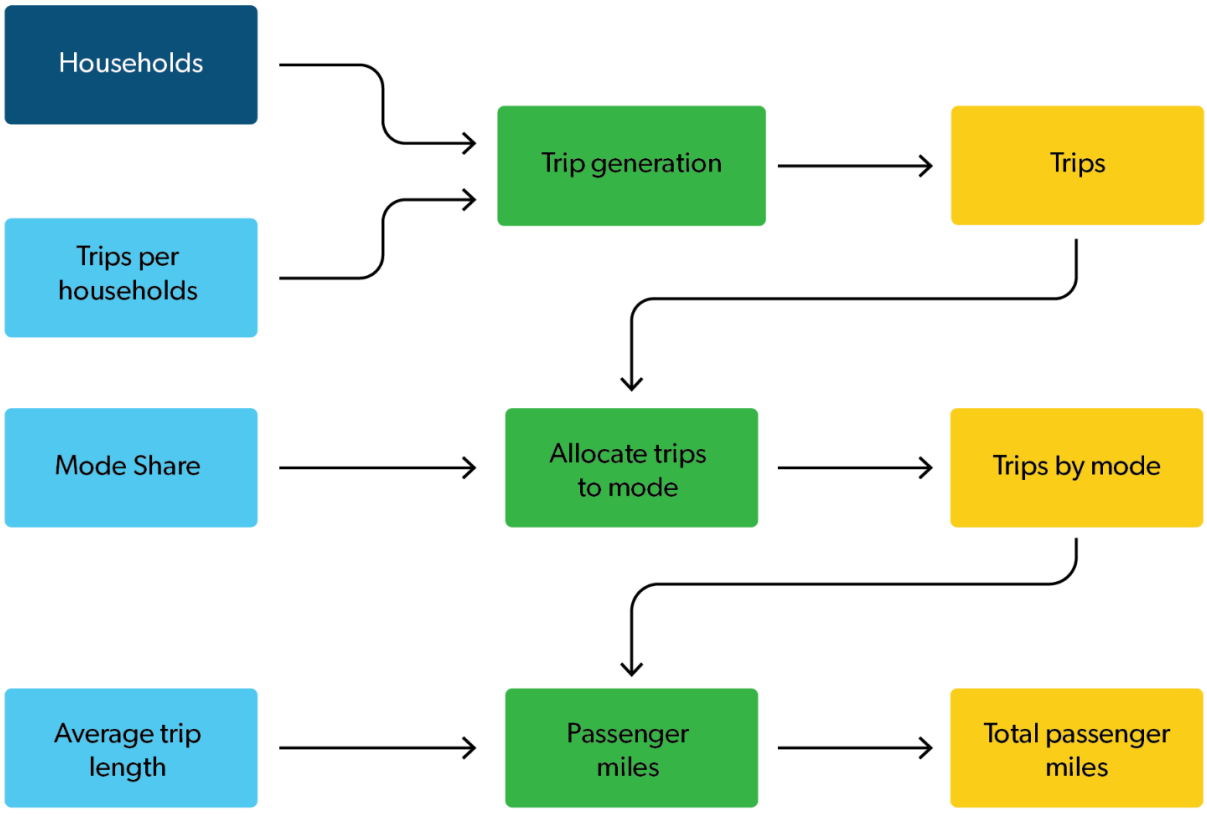
Passenger Transportation

How the Sub-Model Works

The model captures personal transportation energy use by modeling household travel. Families make trips for various purposes (work, school, socializing, errands, drop-offs, shopping), and these trips are shared out over the various modes of transportation (walk, bike, auto, transit). The energy use and emissions associated with various types of personal vehicles are calculated by assigning VMT to a stock-turnover personal-vehicle model. The induced approach is used to track emissions. See Figure B.9

[6] National Renewable Energy Laboratory (NREL). ResStock™ Analysis Tool. Available at: https://resstock.nrel.gov/
[7] U.S. Energy Information Administration (EIA). Commercial Buildings Energy Consumption Survey (CBECS). Available at: https://www.eia.gov/consumption/commercial/
[8] U.S. Environmental Protection Agency (EPA). ENERGY STAR® Portfolio Manager: U.S. National Median Table. Available at: https://portfoliomanager.energystar.gov/pdf/reference/US%20National%20Median%20Table.pdf

Figure B.9. Conceptual diagram of how the model generates trips, trips by mode, and total miles traveled, per a given year. Dark blue rectangles represent stocks, light blue rectangles represent model parameters, green rectangles represent calculations made in the model, and yellow rectangles represent model outputs. All the outputs in this case represent flows.



How the Sub-Model is Calibrated

The model is calibrated using data from the Nevada Department of Transportation[9] (NDOT), including 2021 Highway Performance Monitoring System[10] (HPMS) data, to reflect vehicle miles traveled (VMT) by county. A stock of personal-use vehicles is coupled with the VMT data to calculate energy consumption for personal vehicle use. This category is supplemented by transit fuel use (calculated on the basis of bus VMT), recreational marine fuel use and off-road fuel use. The remaining commercial vehicle energy use is

[9] Nevada Department of Transportation. 2023 Annual Vehicle Miles of Travel (AVMT) Report: 2022 HPMS Data Year. Available at: https://www.dot.nv.gov/home/showpublisheddocument/21984/638282858708900000
[10] Federal Highway Administration. Highway Statistics 2022. U.S. Department of Transportation. Available at: https://www.fhwa.dot.gov/policyinformation/statistics/2022/

then calibrated so that total energy use by the transportation sector is aligned with the State Energy Data System.[11]

The modeled stock of personal vehicles by size, fuel type, efficiency and vintage was informed by the regional vehicle registration statistics. The total number of personal-use vehicles is proportional to the projected number of households in the BAU. Transit VMT and fuel consumption were modeled based on bus VMT data from Mobility Database.[12]

Waste and Wastewater

How the Sub-Model Works

Households and occupants of non-residential buildings generate solid waste and wastewater. The model traces various pathways to disposal, compost and sludge, including those that capture energy from incineration and recovered gas. Emissions accounting is performed throughout the waste sub-model.

How the Sub-Model is Calibrated

Solid waste stream composition and routing data (landfill, composting, recycling) is sourced from the Nevada Division of Environmental Protection (NDEP)'s 2023 Recycling and Waste Reduction Report. Historical solid waste data by county, waste type, and volume (in tons) was also provided by NDEP to support the analysis. The base carbon content in landfilled waste is estimated using these historical trends. Total methane emissions from landfills are calculated using the first-order decay model, with the methane generation constant and methane correction factor set to default values recommended by the IPCC guidelines for landfill emissions.

Energy Flow and Local Energy Production

How the Sub-Model Works

Energy produced from primary sources (e.g., solar, wind) is modeled alongside energy converted from imported fuels (e.g., electricity generation, combined heat and power (CHP)). The model accounts for conversion efficiency.

[11] U.S. Energy Information Administration. State Energy Data System (SEDS): Transportation Sector Energy Consumption Estimates, Nevada. Available at: https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep_use/tra/use_tra_NV.html&sid=NV
[12] Mobility Database. Nevada Transit Feeds. Available at: https://mobilitydatabase.org/feeds?q=nevada

How the Sub-Model is Calibrated

Nevada's electricity consumption is estimated using state-level totals from the U.S. Energy Information Administration's State Energy Data System.[13] To allocate electricity consumption across counties, we utilize data from the National Renewable Energy Laboratory's State and Local Planning for Energy[14] (SLOPE) platform, which provides modeled estimates of energy consumption by county based on factors such as building stock, economic activity, and demographic patterns. While Nevada generates a significant amount of electricity in-state, it also participates in regional power exchanges. The difference between total electricity demand and in-state generation reflects annual net electricity imports or exports, calculated as:

$$Energy_{Generation} + Energy_{Imports} = Energy_{Consumption} + Energy_{Exports}$$

The calibration of local energy production in Nevada draws on data from the U.S. Department of Energy's Combined Heat and Power (CHP) Installation Database[15], which includes detailed information on system capacity, fuel type, and operational characteristics across the state. Distributed solar generation is similarly calibrated using utility-reported net metering data from EIA Form 861[16], which provides installed capacity by customer type and utility service area. Together, these sources support a more accurate estimation of local energy generation.

Natural and Working Lands

How the Sub-Model Works

A spatial representation of the area of natural and working lands is developed under current conditions. Stocks of carbon are identified for each vegetation type (forests, grasslands and wetlands). These areas evolve according to land-use projections in the model, resulting from, for example, expansion of urban areas or, conversely, expansion of green spaces. The carbon stored in the vegetation changes accordingly.

[13] U.S. Energy Information Administration. State Energy Data System (SEDS): Nevada. Available at: https://www.eia.gov/state/seds/seds-data-complete.php?sid=NV
[14] National Renewable Energy Laboratory. State and Local Planning for Energy (SLOPE) Platform. Available at: https://maps.nrel.gov/slope
[15] U.S. Department of Energy. Combined Heat and Power (CHP) Installation Database. Maintained by ICF International. Available at: https://doe.icfwebservices.com/chpdb
[16] U.S. Energy Information Administration. Form EIA-861: Annual Electric Power Industry Report. Available at: https://www.eia.gov/electricity/data/eia861/

How the Sub-Model is Calibrated

The model is calibrated by identifying the land cover categories and their relevant areas in the study geography for the base year. Depending on data resolution, different categories of forest (age, structure, species) may be represented with different levels of carbon storage.

$$GHG_{Sequestration} = GHG_{forests} + GHG_{grasslands} + GHG_{wetlands}$$

B.4 Financial Analysis

Energy-related financial flows and employment impacts are captured through an additional layer of model logic. The financial flows calculated by the model include the capital, operating and maintenance cost of both energy-consuming and energy-producing stocks, including fuel costs. Employment related to the construction of new buildings, retrofit activities and energy infrastructure is also modeled.

B.4.1 Scope

Costs and savings modeling considers upfront capital expenditures and operating and maintenance costs (including fuel and electricity). Table 3 summarizes expenditure types evaluated.

Table B.4. Categories of expenditures evaluated.

Category	Description
Residential buildings	Cost of dwelling construction and retrofitting; operating and maintenance costs (non-fuel).
Residential equipment	Cost of appliances and lighting, heating and cooling equipment.
Residential fuel	Energy costs for dwellings and residential transportation.
Commercial buildings	Cost of building construction and retrofitting; operating and maintenance costs (non-fuel).
Commercial equipment	Cost of lighting, heating and cooling equipment.
Commercial vehicles	Cost of vehicle purchase; operating and maintenance costs (non-fuel).
Non-residential fuel	Energy costs for commercial buildings, industry and transport.
Energy production fuel	Cost of purchasing fuel for generating local electricity, heating and cooling.

Category	Description
Energy production equipment	Cost of the equipment for generating local electricity, heating and cooling.
Energy production revenue	Revenue derived from the sale of locally generated electricity or heat.
Personal-use vehicles	Cost of vehicle purchase; operating and maintenance costs (non-fuel).
Active transportation infrastructure	Costs of bike lane and sidewalk construction.
Natural and working Lands	Costs of working with and preserving natural and working lands.

A financial cost catalog that summarizes all the financial assumptions used in the model is available as a separate document.

B.4.2 Financial Reporting Principles

The financial analysis is guided by the following reporting principles:

1. Sign convention: Costs are negative. Revenue and savings are positive.
2. The financial viability of investments is measured by their net present value (NPV).
3. All cash flows are assumed to occur on the last day of the year. For purposes of estimating their present value in Year 1, they are discounted back to time zero (the beginning of Year 1). This means that the initial capital outlay in Year 1 is discounted by a full year for purposes of present value calculations.
4. A 3% discount rate is used to evaluate the present value of future government costs and revenues.
5. Each category of stocks has a different investment horizon, depending on the kind of stock. (For example, a house has a different lifespan than a car.)
6. Any price increases included in the analysis for fuel, electricity, carbon or capital costs are real price increases, net of inflation.
7. Where a case can be made that a measure will continue to deliver savings after its economic life (e.g., after 25 years in the case of the longest-lived measures), the revenue forecast for the post-horizon years is capitalized and the amount is added to the final year of the investment horizon cash flow.
8. In presenting results of the financial analysis, results are rounded to the nearest thousand dollars, unless additional precision is meaningful.
9. Only actual cash flows are included in the financial analysis.

The key concepts used to analyze the financial impacts are summarized below.

Costs Are Relative to the BAP Scenario

This financial analysis tracks projected costs and savings associated with measures in the LC, MF, and CD scenarios that are above and beyond the costs in the BAP Scenario, as well as the costs and savings for each measure in the scenarios.

Discount Rate

The discount rate is the baseline growth value an investor places on their investment dollar. A project is considered financially beneficial by an investor if it generates a real rate of return equal to or greater than their discount rate.

An investor's discount rate varies with the type of project, duration of the investment, risk and the scarcity of capital. The social discount rate is the discount rate applied for comparing the value to society of investments made for the common good and, as such, it is inherently uncertain and difficult to determine. Some argue that a very low or even zero discount rate should be applied in the evaluation of climate change mitigation investments. In this project, investments in a low-carbon future are evaluated with a 3% discount rate.[17]

Net Present Value

The net present value of an investment is the difference between the present value of the capital investment and the present value of the future stream of savings and revenue generated by the investment.

Four aggregate categories are used to track the financial performance of the climate measures in this analysis: capital expenditures, energy savings (or additional costs), operation and maintenance savings, and revenue generation (associated with renewable energy production facilities and some transit measures). Administrative costs associated with implementing programs, as well as any energy system infrastructure upgrades that may be required are excluded.

Similarly, the broader social costs that are avoided from mitigating climate change, such as avoided health costs or avoided damages from climate change are not included in this part of the financial analysis., These consideration are instead represented in the social cost of greenhouse gases section (definition found below).f

Abatement Cost

The abatement cost of a measure is the estimated cost for that measure to reduce one tonne of GHG emissions, which is calculated by dividing the measure's NPV by the total GHG emissions reductions (tCO2e) resulting from the measure. For example, if a project has a

[17] Kevin Rennert, Cora Kingdon, and Brian C. Prest, *Social Cost of Carbon 101*, Resources for the Future, first published August 1, 2019, last updated March 13, 2025, https://www.rff.org/publications/explainers/social-cost-carbon-101/

NPV of $1,000 and reduces emissions by 10 tCO2e, its abatement cost is $100 per tCO2e reduced. If a project has an NPV of -$1,000 (saves $1,000) and it results in 20 tCO2e of savings, its abatement cost would be -$50 per tCO2e reduced.

Social Cost of Greenhouse Gases

The objective of reducing GHG emissions is to prevent or limit damages from climate change. These damages are an externality, in that the costs are not directly paid by the consumers of fossil fuels, which is the source of climate change. Economists have used models to calculate the damages from future climate change impacts, expressed as the social cost of greenhouse gas emissions (SC-GHG),[18] with a dollar value per ton that increases over time. The SC-GHG includes changes in net agricultural productivity, human health effects, property damage from increased flood risk, changes in the frequency and severity of natural disasters, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services.

Climate change threatens the existence of humanity. Some economists and scientists have questioned the value of assigning an economic cost to something which is infinitely valuable, as it arbitrarily signals a valuation incommensurate with the risk.[19]

SSG does not use the SCC to inform policy directions; rather it is used as an illustration of the value of climate measure. For this purpose a SCC with a 2% discounting rate has been applied[20]; the social cost of methane and nitrous oxides are not included.

B.4.3 Employment Impacts

Employment impacts are calculated by applying a multiplier to capital expenditures by sector. Multipliers represent the number of person-years of employment that are generated per million dollars of capital expenditure. Different categories of capital expenditure are more or less capital intensive, as represented by the multiplier. A person-year of employment refers to one year of work; it is time bound to correspond with the duration of the capital expenditure.

[18] Rennert, Kevin, Frank Errickson, Brian C. Prest, Lisa Rennels, Richard G. Newell, William Pizer, Cora Kingdon et al. "Comprehensive evidence implies a higher social cost of CO2." Nature 610, no. 7933 (2022): 687-692

[19] For example, see: Pindyck, Robert S. "Climate change policy: what do the models tell us?." Journal of Economic Literature 51, no. 3 (2013): 860-872

[20] Resources for the Future, 2022. Social Cost of Carbon Explorer, https://www.rff.org/publications/data-tools/scc-explorer/ (linear extrapolation between decades). Settings included: RFF-SPs, temperature-fair, sea level rise- BRICK, ocean PH- Fung, Damages- aggregate, Howard & Stern, Discounting- 2%

B.5 Data and Assumptions

B.5.1 Scenario Development

Scenarios are used to evaluate potential futures for communities or states. A scenario is defined as an internally consistent view of what the future might turn out to be — not a forecast but one possible future outcome. Scenarios represent plausible options as identified by participants in the project. For example, in the building sector, scenarios are generated by identifying future population projections, estimating how many additional households are required and then applying those additional households according to the existing land-use plans and alternative scenarios. The model then evaluates the impact of new development on transportation behavior, building types, agricultural and forest land and other variables.

B.5.2 Business-as-Usual Scenario

The BAU Scenario estimates energy use and emissions volumes from the base year (2021) to the target year (2050). As it assumes the absence of policy measures that would differ substantially from those currently in place, the scenario can be considered a projection of what would happen if nothing changes, except for anticipated population and economic growth.

Methodology

1. Calibrate model and develop a 2021 base-year data set for the state using observed data and filling in gaps with assumptions where necessary.

2. Input existing projected quantitative data to 2050 where available, including:

    - Population, employment and housing projections by zone
    - Build out (buildings) projections by county
    - Transportation modeling from the State
    - Economic growth projections
    - Heating and cooling degree days projections

3. Where quantitative projections are not carried through to 2050, extrapolate what the projected trend would be to 2050.

B.5.3 Business-as-Planned Scenario

The BAP Scenario estimates energy use and emissions volumes from the base year (2021) to the target year (2050), incorporating assumptions about the likely effects of planned policies and programs.

Methodology

1. Create BAU Scenario (see steps above).

2. Identify the programs and regulations adopted.

    a. Add additional assumptions to the BAU Scenario to capture known policies and plans that are or will be implemented in the coming years:

        - Full List of Relevant Federal, State, and Local Policies and Plans available in Appendix D1.

    b. In all cases: Where quantitative projections are not carried through to 2050, historical trends are extrapolated to 2050.

3. Where specific quantitative projections are not available, assumptions are identified by:
    a. Analyzing current, on-the-ground implementation (reviewing action plans, engagement with staff, etc.) and where possible, quantifying the measure.

    b. Analyzing existing policy that has potential impact and, where possible, quantifying the potential impact.

Low-Carbon Scenarios

Changes to energy flow and emissions profiles are illustrated by modeling potential changes in the context (e.g., population, development patterns) and by projecting energy services demand intensities, waste production, diversion rates, industrial processes and composition of the energy system infrastructure.

Policies, Measures and Strategies

Alternative behaviors of actors (e.g., households, various levels of government, industry, etc.) can be reflected by adjusting input variables. Varying the inputs creates "what if"-type scenarios, enabling a flexible mix-and-match approach that connects behavioral assumptions to the physical model. A wide variety of policies, measures and strategies can be explored in this way, and the scenarios are highly flexible. The resolution of the model enables the user to apply scenarios to specific counties, technologies, building or vehicle types or eras and configurations of the built environment.

Methodology for Low-Carbon Scenarios (LC, MF and CD)

measures are identified using three sources:

- Interviews with state agencies
- Interviews and workshops with other interested parties
- SSG's internal catalogue of measures based on experience and market research

In conjunction with these sources, the following steps are taken to translate ideas into measures to model:

1. Identify the technological potential of each measure or group of measures to reduce energy and emissions by quantifying the measures:
    a. Verify if the measure or strategy specifically incorporates a projection or target. If there is a stated intention or goal, review best practices and literature to quantify that goal.
    b. Identify any measures that are overlapping and/or include dependencies on other measures.
2. Translate the measures into quantified assumptions over time ("parameterization").
3. Apply the assumptions to relevant sectors in the model to develop a low-carbon scenario (i.e., apply the technological potential of the measures to the model), incorporating the same quantified assumptions of the common principles for all low-carbon scenarios for this project.
4. Analyze results of the low-carbon scenario against the overall target.
5. If the target is not achieved, identify variables to scale up and provide a rationale for doing so.
6. Iteratively adjust variables to identify a pathway to the target.
7. Develop a marginal abatement cost curve for the low-carbon scenario.

Scenario Development

Three low-carbon scenarios were developed to explore distinct decarbonization pathways: an ambitious electrification-focused transition (LC), a moderate mixed-fuels approach aligned with state goals (MF), and a scenario prioritizing early benefits for vulnerable populations (CD).

Addressing Uncertainty

All modeling involves some level of uncertainty. Even with data that accurately reflects local conditions, it is difficult to project how conditions and behaviors will respond to broader societal changes and what those changes will be.

The SSG modeling approach uses four strategies for managing uncertainty applicable to community energy and emissions modeling:

1. **Sensitivity analysis:** One of the most basic ways of studying complex systems is sensitivity analysis, which helps quantify uncertainty in a model's output. To perform this assessment, each of the model's input parameters is drawn from a statistical distribution in order to capture the uncertainty in the parameter's true value (Keirstead, Jennings, & Sivakumar, 2012).[21]

   Approach: Selected variables are modified by ±10-20% to illustrate the impact that an error of that magnitude has on the overall total.

2. **Calibration:** One way to challenge untested assumptions is the use of "back-casting" to ensure that the model can "forecast the past" accurately. The model can then be calibrated to generate historical outcomes in order to better replicate observed data.

   Approach: Variables are calibrated in the model by using two independent sources of data. For example, the model calibrates building energy use (derived from building data) against actual electricity data from the electricity distributor.

3. **Scenario analysis:** Scenarios are used to demonstrate that a range of future outcomes is possible given the current conditions and that no one scenario is more likely than another.

   Approach: Scenarios are conceptualised in close collaboration with local experts and interested parties, which are then represented in the model.

4. **Transparency:** The provision of detailed sources for all assumptions is critical to enabling policy-makers to understand the uncertainty intrinsic in a model.

   Approach: Modeling assumptions and inputs are presented in this document.

[21] James Keirstead, Mark Jennings, and Aruna Sivakumar, "A review of urban energy system models: Approaches, challenges and opportunities," *Renewable and Sustainable Energy Reviews* 16, no. 6 (2012): 3847. https://doi.org/10.1016/j.rser.2012.02.047

B.5.4 Detailed Emissions Scope Table

Table B.5. Detailed emissions scope

GHG Emissions Sources & GHG Types			
Transportation	**CO2**	**CH4**	**N2O**
On-road transportation, railways, water-borne navigation, aviation, off-road transportation	Motor gasoline, distillate fuel, natural gas, residual fuel, lubricants, aviation gasoline, liquefied petroleum gas (LPG), light rail electricity use, Naphtha		
Residential Buildings	**CO2**	**CH4**	**N2O**
Emissions from fuel combustion and grid-supplied energy consumed by residential buildings	Residential electricity use, natural gas consumption, petroleum consumption, coal consumption		
Commercial Buildings	**CO2**	**CH4**	**N2O**
Emissions from fuel combustion and grid-supplied energy consumed by commercial buildings	Commercial electricity use, natural gas combustion, petroleum combustion, and coal combustion		
Industrial Emissions	**CO2**	**CH4**	**N2O**
Emissions from on-site stationary combustion and industrial processes that emit GHGs (such as cement manufacturing, semiconductor manufacturing, or aluminum production)	Industrial electricity use, natural gas combustion, petroleum combustion, cement manufacture, coal combustion, ammonia production, urea consumption, iron and steel production, soda ash production and consumption, limestone and dolomite use, lime manufacture		
Energy and Electricity Production	**CO2**	**CH4**	**N2O**
Emissions from in-county electricity generation and distribution of fuels	Generation of steam, generation of electricity from non-renewables, natural gas pipeline transmission, fugitive emissions from pipelines		

B.5.5 Emissions Assumptions

Table B.5. Emissions factors used in the model.

Category	Value	Comment
Natural gas	CO2: 53.06 kg/MMBtu CH4: 0.001 kg/MMBtu N2O: 0.0001kg/MMBtu	Sourced from the EPA Center for Corporate Climate Leadership's GHG Emission Factors Hub https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_mar2020.pdf (2020)
Renewable natural gas	CH4: 0.001 kg/MMBtu N2O: 0.0001kg/MMBtu	Sourced from the EPA Center for Corporate Climate Leadership's GHG Emission Factors Hub https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_mar2020.pdf (2020)
Electricity	State wide composite plant-specific emission rates (2019) CO2e: 385.59 lbs CO2e per MWh	eGRID2019 Data File https://www.epa.gov/egrid/download-data
Gasoline	CO2: 69.55 kg/MMBtu CH4: 4.22 g/MMBTU N2O: 0.66 g/MMBTU	National inventory report 1990-2019 : Greenhouse Gas Sources and Sinks in Canada. Part 2. Table A6.1–14 This source was used because the units are compatible with SSG's model structure, which uses emission factors per energy unit instead of per mile.
Diesel	Light Duty Vehicles CO2: 73.84 kg/MMBtu CH4: 1.88 g/MMBTUmile N2O: 6.06 g/MMBTU Medium/Heavy Duty Vehicles CO2: 73.84 kg/MMBtu CH4: 3.03 g/MMBTU N2O: 4.16 g/MMBTU	National inventory report 1990-2019 : Greenhouse Gas medium. Sources and Sinks in Canada. Part 2 Table A6.1–14 This source was used because the units are compatible with SSG's model structure, which uses emission factors per energy unit instead of per mile.
Fuel oil	CO2: 73.9 kg per MMBtu CH4: 0.003 kg per MMBtu N2O: 0.0006 kg per MMBtu	Environmental Protection Agency. "Emission factors for greenhouse gas inventories." Stationary Combustion Emission Factors," US Environmental Protection Agency, available: https://www.epa.gov/sites/production/files/2015-07/documents/emission-factors_2014.pdf (2014) Table 1 Stationary Combustion Emission Factor, Fuel Oil No. 2

Category	Value	Comment
Wood	CO2: 93.80 kg per MMBtu CH4: 0.0072 kg per MMBtu N2O: 0.0036 kg per MMBtu	Environmental Protection Agency. "Emission factors for greenhouse gas inventories." Stationary Combustion Emission Factors," US Environmental Protection Agency, available: https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_mar2020.pdf (2020) Table 1 Stationary Combustion Emission Factor, Biomass fuels: Wood and Wood Residuals
Propane	CO2: 62.87 kg per MMBtu CH4 : 0.003 kg per MMBtu N2O: 0.0006 kg per MMBtu For mobile combustion: CO2: 5.7 kg per gallon	Environmental Protection Agency. "Emission factors for greenhouse gas inventories." Stationary Combustion Emission Factors," US Environmental Protection Agency, available: https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_mar2020.pdf (2020) Table 1 Stationary Combustion Emission Factor, Petroleum Products: Propane Table 2 Mobile Combustion CO2 Emission Factors: Propane
GHGs	Carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O) are included. GWP CO2 = 1 CH4 = 28 N2O = 265	Global warming potential (GWP) assumptions are sourced from the Intergovernmental Panel on Climate Change (IPCC)'s Fifth Assessment Report.

Benefits Analysis

The IPCC defines co-benefits as "the positive effects that a policy or measure aimed at one objective might have on other objectives, irrespective of the net effect on overall social welfare."[22] The term co-benefits and its corollary, co-harms, have a variety of synonyms, including "ancillary effects" and "ancillary benefits and costs," and an equal variety of definitions. In this analysis, co-benefits are assumed to be any potential or anticipated benefits of the measure in addition to its impact on GHG emissions. Table B.5 describes the benefits analysed, relevant indicators and the method of analysis applied.

[22] IPCC. (2014). Annex II: Glossary [Agard, J., E.L.F. Schipper, J. Birkmann, M. Campos, C. Dubeux, Y. Nojiri, L. Olsson, B. Osman-Elasha, M. Pelling, M.J. Prather, M.G. Rivera-Ferre, O.C. Ruppel, A. Sallenger, K.R. Smith, A.L. St. Clair, K.J. Mach, M.D. Mastrandrea, and T.E. Bilir (eds.)]. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Barros, V.R., C.B. Field, D.J. Dokken, M.D. Mastrandrea, K.J. Mach, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1757-1776. p. 1762.

Table B.5. Overview of categories assessed, specific impacts and indicators and the analytical method used.

Category	Impact Overview	Indicators
Health Impacts		
Outdoor air quality	Changes in outdoor air quality	• Changes in air pollutants from fuel combustion per scenario
Indoor air quality	Changes in air quality inside homes and businesses	• Fuel type used in residential and commercial buildings per scenario
Physical and emotional well-being	Changes in physical activity, changes in mental well-being	• Mode share of a one-person trip by scenario
Economic Impact		
Household expenditures	Changes in household energy and transportation costs due to energy efficiency	• Household energy and travel expenditures by scenario
Employment opportunities	Changes in employment opportunities	• Jobs created/lost by opportunity areas
Climate Adaptation and Resilience		
Reduction of urban heat island effect	Changes in urban microclimates	• Number of trees planted by scenario per county

Low-Income and At-Risk Communities

Low-income and at-risk communities within the state are identified using the same approach as in the Priority Climate Action Plan. This approach provides information at a census-tract level according to different categories and thresholds. The categories, thresholds and descriptions are provided below (Table B.6).

These communities face socioeconomic disparities in addition to environmental, climate, health and other burdens. Census tracts are considered disadvantaged if they are at or above the 65th percentile for the number of low-income households and at or above the

90th percentile for one of the data indicators described in Table B.6.[23] A census tract that is surrounded by disadvantaged communities and is at or above the 50th percentile for low income is also considered disadvantaged. Federally recognized Tribes are also considered disadvantaged communities.

The analysis enables a comparison of the social, environmental and public health burdens faced by individual communities in state and national averages, including environmental and demographic indicators. The indicators include particulate matter 2.5, ozone, diesel particulate matter, air toxics cancer risk, air toxics respiratory hazard index, toxic releases to air, traffic proximity and volume, lead paint, RMP facility proximity, hazardous waste proximity, superfund proximity, underground storage tanks and wastewater discharge.

Table B.6. Categories and data indicators used in the analysis.

Indicator or Threshold	Definition
Public Health	
Air toxics cancer risk	Lifetime cancer risk from inhalation of air toxics
Air toxics respiratory hazard index	Ratio of exposure concentration to health-based reference concentration
Asthma	Share of people who answer “yes” to both of these questions: Have you ever been told by a health professional that you have asthma? Do you still have asthma?
Cardiovascular disease	Share of people ages 18 years and older who have been told by a health professional that they had angina or coronary heart disease
Diabetes	Share of people ages 18 years and older who have been told by a health professional that they have diabetes other than diabetes during pregnancy
Food desert	Low-income and low-access tract measured at 1 mile for urban areas and 10 miles for rural areas, according to the USDA
Lead paint	Share of homes built before 1960, which indicates potential lead paint exposure
Low life expectancy	Average number of years people have left in their lives
Economic Burdens	
Energy cost	Average household annual energy cost in dollars divided by the average household income
Historic underinvestment	Census tracts that experienced historic underinvestment based on redlining maps between 1935 and 1940
Housing burden	Share of households that are both earning less than 80% of Housing and Urban Development’s Area Median Family Income and are spending more than 30% of their income on housing costs

[23] Except in the categories of workforce development, for which a community is classified as disadvantaged when one of the described burdens is exceeded (90th percentile for each indicator) and when more than 10% of people ages 25 years or older have less educational attainment than a high school diploma.

Indicator or Threshold	Definition
Lack of green space	Share of land with developed surfaces covered with artificial materials like concrete or pavement, excluding crop land used for agricultural purposes
Lack of indoor plumbing	Housing without indoor kitchen facilities or complete plumbing facilities
Less than high school education	Percent of the population over age 25 with less than a high school education
Low income	Low median income calculated as a share of the area's median income
Poverty	Share of people living at or below 100% of the federal poverty level
Transportation barriers	Average relative cost and time spent on transportation relative to all other tracts
Unemployment	Number of unemployed people as a share of the labor force
Vulnerable Populations	
Linguistic isolation	Share of households where no one over age 14 speaks English very well
Over age 64	Percent of people over the age of 64
People of color	The percent of individuals who list their racial status as anything other than non-Hispanic white-alone (non-multiracial) individuals
Under age 5	Percent of people under the age of 5
Air pollution	
Diesel particulate matter	Mixture of particles in diesel exhaust in the air, measured as micrograms per cubic meter
Ozone	Average of the annual top 10 daily maximum eight-hour ozone concentrations in air for 2017-2019
Particulate matter 2.5	Fine inhalable particles with 2.5 or smaller micrometer diameters
Toxic releases from facilities	Modeled toxicity-weighted concentrations in air of EPA Toxic Release Inventory listed chemicals
Traffic impact	Number of vehicles (average annual daily traffic) at major roads within 500 meters
Land and Water Pollution	
Abandoned mine land	Presence of an abandoned mine left by legacy coal mining operations
Clean-up sites	Number of proposed or listed Superfund or National Priorities List (NPL) sites within 5 kilometers
Formerly Used Defense Sites (FUDS)	Properties that were owned, leased or possessed by the United States, under the jurisdiction of the Secretary of Defense prior to October 1986
Groundwater threats	Weighted formula of the density of leaking underground storage tanks and the number of all active underground storage tanks within 1,500 feet of the census tract boundaries
Hazardous waste	Number of hazardous waste facilities (treatment, storage and disposal facilities and large quantity generators) within 5 kilometers

Indicator or Threshold	Definition
Impaired waters/ wastewater discharge	Risk-Screening Environmental Indicators (RSEI) modeled toxic concentrations at stream segments within 500 meters
Proximity to Risk Management Plan (RMP) facilities	Count of RMP facilities within 5 kilometers
Climate Risks	
Expected agriculture loss rate	Expected agricultural value at risk from losses due to natural hazards
Expected building loss rate	Expected building value at risk from losses due to natural hazards
Expected population loss rate	Expected fatalities and injuries due to natural hazards
Projected flood risk	Number of properties at risk of floods occurring in the next 30 years
Projected wildfire risk	Calculated from inputs associated with fire fuels, weather, human influence and fire movement

Co-Pollutant Reductions

ScenaCorporate/ScenaEnergy generates air pollutants for each of the scenarios modelled. The air pollutants are then uploaded to EPA's CO–Benefits Risk Assessment (COBRA).[24]

Table B.7. Air pollutants exported from ScenaCorporate/ScenaEnergy and evaluated in COBRA

Air pollutants	Formula	Relevant sectors
Nitrous oxides	NO_2	Transportation, industry, stationary energy consumption, electricity generation
Particulate matter	$PM_{2.5}$	Transportation, industry, stationary energy consumption, electricity generation
Volatile organic compounds	VOC	Transportation, industry, stationary energy consumption, electricity generation

COBRA quantifies changes in air quality using a simple air quality model to estimate the effects on ambient particulate matter and ozone, which are then linked to epidemiological

[24] EPA (2025), User's Manual for the Co-Benefits Risk Assessment Health Impacts Screening and Mapping Tool (COBRA). Retrieved from: https://www.epa.gov/system/files/documents/2025-03/cobra-user-manual-v5.2.pdf

studies to calculate avoided illnesses and deaths and the related economic value. COBRA estimates the following health incidences:

- Adult and infant mortality,
- Non-fatal heart attacks,
- Respiratory and cardiovascular-related hospital admissions,
- Respiratory, cardiovascular, and asthma-related emergency room
- visits,
- Asthma incidences,
- Lung cancer incidences,
- Hospitalizations from Alzheimer's and Parkinson's disease,
- Stroke incidences,
- Hay fever/rhinitis incidences,
- Minor restricted activity days, and
- Work and school loss days

The COBRA analysis is conducted on a per county basis for the years 2028 and 2050, as these are the years available in the tool, with the intervening years calculated as an extrapolation of the data for the preceding calculated year.

Appendix C: GHG Inventory

Table C.1. 2021 Inventory

Table 4.3 GHG Emissions Report

					tonne / year				
GPC ref No.	**Scope**	**GHG Emissions Source**	**Included**	**Reason for exclusion (if applicable)**	**CO2**	**CH4**	**N2O**	**Total CO2e**	
I		**STATIONARY ENERGY SOURCES**							**21,473,948**
I.1		**Residential buildings**							
I.1.1	1	Emissions from fuel combustion within the boundary	**Yes**		2,487,006	9,694	2,052	2,498,752	
I.1.2	2	Emissions from grid-supplied energy consumed within the boundary	**Yes**		4,788,583	5,250	7,098	4,800,931	
I.1.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	**Yes**		149,044	163	221	149,428	**7,449,111**
I.2		**Commercial and institutional buildings/facilities**							
I.2.1	1	Emissions from fuel combustion within the boundary	**Yes**		1,745,440	946	936	1,747,322	

Table 4.3 GHG Emissions Report

					tonne / year				
GPC ref No.	**Scope**	**GHG Emissions Source**	**Included**	**Reason for exclusion (if applicable)**	**CO2**	**CH4**	**N2O**	**Total CO2e**	
I.2.2	2	Emissions from grid-supplied energy consumed within the boundary	**Yes**		3,875,267	4,249	5,745	3,885,261	
I.2.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	**Yes**		120,617	132	179	120,928	**5,753,511**
I.3		**Manufacturing industry and construction**							
I.3.1	1	Emissions from fuel combustion within the boundary	**Yes**		4,166,419	4,884	7,720	4,179,022	
I.3.2	2	Emissions from grid-supplied energy consumed within the boundary	**Yes**		3,736,405	4,097	5,539	3,746,040	
I.3.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	**Yes**		116,295	128	172	116,595	**8,041,658**
I.4		**Energy industries**							
I.4.1	1	Emissions from energy used in power plant auxiliary operations within the boundary	**No**	NR	0	0	0	0	

Table 4.3 GHG Emissions Report

					tonne / year				
GPC ref No.	**Scope**	**GHG Emissions Source**	**Included**	**Reason for exclusion (if applicable)**	**CO2**	**CH4**	**N2O**	**Total CO2e**	
I.4.2	2	Emissions from grid-supplied energy consumed in power plant auxiliary operations within the boundary	**No**	NR	0	0	0	0	
I.4.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption in power plant auxiliary operations	**No**	NR	0	0	0	0	
I.4.4	1	Emissions from energy generation supplied to the grid	**No**	NR	0	0	0	0	**0**
I.5		**Agriculture, forestry and fishing activities**							
I.5.1	1	Emissions from fuel combustion within the boundary	**Yes**		26,010	14	13	26,037	
I.5.2	2	Emissions from grid-supplied energy consumed within the boundary	**No**	NR	152,137	167	226	152,529	
I.5.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	**No**	NR	4,735	5	7	4,747	**183,314**
I.6		**Non-specified sources**							

Table 4.3 GHG Emissions Report

					tonne / year				
GPC ref No.	**Scope**	**GHG Emissions Source**	**Included**	**Reason for exclusion (if applicable)**	**CO2**	**CH4**	**N2O**	**Total CO2e**	
I.6.1	1	Emissions from fuel combustion within the boundary	**No**	NR	0	0	0	0	
I.6.2	2	Emissions from grid-supplied energy consumed within the boundary	**No**	NR	0	0	0	0	
I.6.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	**No**	NR	0	0	0	0	**0**
I.7		**Fugitive emissions from mining, processing, storage, and transportation of coal**							
I.7.1	1	Emissions from fugitive emissions within the boundary	**No**	NR	0	0	0	0	
I.8		**Fugitive emissions from oil and natural gas systems**							
I.8.1	1	Emissions from fugitive emissions within the boundary	**Yes**		150	46,204	0	46,355	**46,355**
II		**TRANSPORTATION**							**17,163,867**
II.1		**On-road transportation**							
II.1.1	1	Emissions from fuel combustion for on-road transportation occurring within the boundary	**Yes**		10,983,378	22,587	58,885	11,064,850	

Table 4.3 GHG Emissions Report

					tonne / year				
GPC ref No.	**Scope**	**GHG Emissions Source**	**Included**	**Reason for exclusion (if applicable)**	**CO2**	**CH4**	**N2O**	**Total CO2e**	
II.1.2	2	Emissions from grid-supplied energy consumed within the boundary for on-road transportation	**Yes**		10,341	11	15	10,367	
II.1.3	3	Emissions from portion of transboundary journeys occurring outside the boundary, and transmission and distribution losses from grid-supplied energy consumption	**Yes**		322	0	0	323	**11,075,217**
II.2		**Railways**							
II.2.1	1	Emissions from fuel combustion for railway transportation occurring within the boundary	**Yes**		7,287	11	741	8,039	
II.2.2	2	Emissions from grid-supplied energy consumed within the boundary for railways	**Yes**		0	0	0	0	
II.2.3	3	Emissions from portion of transboundary journeys occurring outside the boundary, and transmission and distribution losses from grid-supplied energy consumption	**Yes**		0	0	0	0	**8,039**
II.3		**Water-borne navigation**							

Table 4.3 GHG Emissions Report

					tonne / year				
GPC ref No.	**Scope**	**GHG Emissions Source**	**Included**	**Reason for exclusion (if applicable)**	**CO2**	**CH4**	**N2O**	**Total CO2e**	
II.3.1	1	Emissions from fuel combustion for waterborne navigation occurring within the boundary	**No**	N/A	484,746	1,290	3,489	489,524	
II.3.2	2	Emissions from grid-supplied energy consumed within the boundary for waterborne navigation	**No**	N/A	0	0	0	0	
II.3.3	3	Emissions from portion of transboundary journeys occurring outside the boundary, and transmission and distribution losses from grid-supplied energy consumption	**Yes**		0	0	0	0	**489,524**
II.4		**Aviation**							
II.4.1	1	Emissions from fuel combustion for aviation occurring within the boundary	**No**	N/A	0	0	0	0	
II.4.2	2	Emissions from grid-supplied energy consumed within the boundary for aviation	**No**	N/A	0	0	0	0	
II.4.3	3	Emissions from portion of transboundary journeys occurring outside the boundary, and transmission and distribution	**No**	N/A	2,309,222	4,413	44,313	2,357,949	**2,357,949**

Table 4.3 GHG Emissions Report

					tonne / year				
GPC ref No.	**Scope**	**GHG Emissions Source**	**Included**	**Reason for exclusion (if applicable)**	**CO2**	**CH4**	**N2O**	**Total CO2e**	
		losses from grid-supplied energy consumption							
II.5		**Off-road**							
II.5.1	1	Emissions from fuel combustion for off-road transportation occurring within the boundary	**Yes**		3,081,826	97,382	53,608	3,232,815	
II.5.2	2	Emissions from grid-supplied energy consumed within the boundary for off-road transportation	**No**	NR	0	0	0	0	**3,232,815**
III		**WASTE**							**2,052,053**
III.1		**Solid waste disposal**							
III.1.1	1	Emissions from solid waste generated within the boundary and disposed in landfills or open dumps within the boundary	**Yes**		0	1,746,000	0	1,746,000	
III.1.2	3	Emissions from solid waste generated within the boundary but disposed in landfills or open dumps outside the boundary	**Yes**		0	0	0	0	
III.1.3	1	Emissions from waste generated outside the boundary and	**No**	N/A	0	0	0	0	**1,746,000**

Table 4.3 GHG Emissions Report

					tonne / year				
GPC ref No.	**Scope**	**GHG Emissions Source**	**Included**	**Reason for exclusion (if applicable)**	**CO2**	**CH4**	**N2O**	**Total CO2e**	
		disposed in landfills or open dumps within the boundary							
III.2		**Biological treatment of waste**							
III.2.1	1	Emissions from solid waste generated within the boundary that is treated biologically within the boundary	**Yes**		0	0	0	0	
III.2.2	3	Emissions from solid waste generated within the boundary but treated biologically outside of the boundary	**No**	N/A	0	0	0	0	
III.2.3	1	Emissions from waste generated outside the boundary but treated biologically within the boundary	**No**	N/A	0	0	0	0	**0**
III.3		**Incineration and open burning**							
III.3.1	1	Emissions from solid waste generated and treated within the boundary	**Yes**		0	0	0	0	
III.3.2	3	Emissions from solid waste generated within the boundary but treated outside of the boundary	**No**	N/A	0	0	0	0	

Table 4.3 GHG Emissions Report

					tonne / year				
GPC ref No.	**Scope**	**GHG Emissions Source**	**Included**	**Reason for exclusion (if applicable)**	**CO2**	**CH4**	**N2O**	**Total CO2e**	
III.3.3	1	Emissions from waste generated outside the boundary but treated within the boundary	**No**	N/A	0	0	0	0	**0**
III.4		**Wastewater treatment and discharge**							
III.4.1	1	Emissions from wastewater generated and treated within the boundary	**No**	N/A	0	221,930	84,124	306,054	
III.4.2	3	Emissions from wastewater generated within the boundary but treated outside of the boundary	**Yes**		0	0	0	0	
III.4.3	1	Emissions from wastewater generated outside the boundary	**No**	N/A	0	0	0	0	**306,054**
IV		**INDUSTRIAL PROCESSES AND PRODUCT USE (IPPU)**							**1,085,067**
IV.1	1	Emissions from industrial processes occurring within the boundary	**Yes**		1,084,521	244	302	1,085,067	
IV.2	1	Emissions from product use occurring within the boundary	**No**	NR	0	0	0	0	
V		**AGRICULTURE, FORESTRY AND LAND USE (AFOLU)**							**-6,356,311**

Table 4.3 GHG Emissions Report

					tonne / year				
GPC ref No.	**Scope**	**GHG Emissions Source**	**Included**	**Reason for exclusion (if applicable)**	**CO2**	**CH4**	**N2O**	**Total CO2e**	
V.1	1	Emissions from livestock within the boundary	**Yes**		0	1,194,088	15,370	1,209,458	
V.2	1	Emissions from land within the boundary	**No**	NR	-8,217,600	196	651,635	-7,565,769	
V.3	1	Emissions from aggregate sources and non-CO2 emission sources on land within the boundary	**Yes**		0	0	0	0	
VI		**OTHER SCOPE 3**							
VI.1	3	Other Scope 3	**No**	N/A	0	0	0	0	
						Gross	**TOTAL**	**35,418,625**	

Appendix D: Implementation Analysis

D.1 Relevant Regulations, Policies, and Programs

The following provides an overview of the federal, state, and local regulations, policies, and programs that establish the legal authority and offer potential frameworks relevant to implementing CCAN measures. Statutes and regulations define the legal boundaries within which actions must occur, while policies and programs represent examples of approaches that could be built upon or expanded. Their role here is intended to inform possible implementation pathways - not to imply commitment to any specific action or outcome.

Understanding these frameworks is important to identifying the tools available to those implementing climate measures in Nevada, as well as opportunities presented by current law and policy.

D.1.1 Federal Government Regulations, Policies, and Programs

Legislation

American Rescue Plan Act (ARPA)

Administering Agency: U.S. Department of the Treasury
Description: Enacted in March 2021, ARPA provided $1.9 trillion in economic relief to address the impacts of the COVID-19 pandemic, including funding for public health, infrastructure, and economic recovery. ARPA funds have been utilized in Nevada to support projects enhancing public health infrastructure, housing, and workforce development, indirectly contributing to climate resilience and sustainable development.
Key Eligible Activities or Funding Uses: Public health initiatives, infrastructure improvements, housing assistance, and workforce development programs.

Bipartisan Infrastructure Law (BIL)

Administering Agency: U.S. Department of Transportation and other federal agencies
Description: Signed into law in November 2021, BIL (also known as the Infrastructure Investment and Jobs Act or IIJA) allocates $1.2 trillion for infrastructure projects, including transportation, water systems, broadband, and energy infrastructure. BIL provides significant funding to Nevada for transportation emissions reduction, resilience against

climate impacts, and modernization of infrastructure to support clean energy, including some of the programs below.
Key Eligible Activities or Funding Uses: Highway and bridge improvements, public transit enhancements, electric vehicle charging infrastructure, and water system upgrades.

CHIPS and Science Act

Administering Agency: U.S. Department of Commerce and National Science Foundation
Description: Enacted in August 2022, the CHIPS and Science Act invests in domestic semiconductor manufacturing and scientific research to bolster U.S. competitiveness. Relevance to Climate Action Planning: The Act supports Nevada's clean energy and technology sectors by funding research and development, fostering innovation, and creating jobs in sustainable industries.
Key Eligible Activities or Funding Uses: Semiconductor manufacturing, STEM education, research and development in clean energy technologies.

Inflation Reduction Act (IRA)

Administering Agency: U.S. Department of the Treasury and other federal agencies
Description: Signed into law in August 2022, the IRA allocates $369 billion toward energy security and climate change programs, making it the most significant climate legislation in U.S. history. The IRA provides substantial funding for Nevada's clean energy projects, including renewable energy development, energy efficiency improvements, and climate resilience initiatives. Some of the programs created by the IRA are listed below. The programs, policies, and funding mechanisms of the IRA have been under extensive political discussion since early 2025, which adds uncertainty to the funding beyond the short term.

Key Eligible Activities or Funding Uses: Tax incentives for renewable energy, energy efficiency rebates, electric vehicle incentives, and funding for climate resilience projects.

Programs and Policies

Collaborative Problem-Solving Cooperative Agreement Program (CPS)

Administering Agency: U.S. Environmental Protection Agency (EPA)
Description: Provides funding to community-based organizations to develop and implement solutions to local environmental and public health challenges in underserved communities. The program emphasizes partnerships and long-term capacity building. CPS (previously known as EJCPS) supports Nevada’s climate, community and resilience goals by empowering overburdened communities to reduce environmental harms and participate in climate-related decision-making.

Key Eligible Activities or Funding Uses: Eligible uses include air and water quality projects, climate adaptation efforts, and education and engagement activities tied to environmental health outcomes.

EPA Climate and Water Quality Funding for Tribal Nations (2023)

Administering Agency: U.S. Environmental Protection Agency (EPA)
Description: Provides competitive funding to Tribal Nations to support climate resilience, reduce toxic pollutants, and improve water quality and ecosystem health and supports Nevada's Tribal partners in implementing localized climate adaptation and water resilience strategies aligned with statewide goals.
Key Eligible Activities or Funding Uses: Projects may include green infrastructure, wetland restoration, climate-smart water planning, and toxics reduction in culturally significant waterways.

Green and Resilient Retrofit Program (GRRP)

Administering Agency: U.S. Department of Housing and Urban Development (HUD)
Description: Offers grants and loans to improve energy efficiency, reduce greenhouse gas emissions, and increase resilience in HUD-assisted multifamily housing. GRRP enables deep retrofits in Nevada's affordable housing stock, helping to meet energy, climate, and social goals by reducing building emissions and enhancing resident well-being.

Key Eligible Activities or Funding Uses: Funding can be used for energy efficiency upgrades, renewable energy installation, electrification, battery storage, and climate resilience improvements.

Grid Resilience and Innovation Partnerships Program (GRIP)

Administering Agency: U.S. Department of Energy (DOE)
Description: Provides competitive grants to modernize the electric grid, improve system reliability, and enhance resilience to climate-driven hazards. The program supports technology innovation and interregional transmission planning. GRIP strengthens Nevada's ability to withstand climate-related power disruptions, integrate renewables, and prepare for increased electrification demands.

Key Eligible Activities or Funding Uses: Projects may include microgrids, grid hardening, transmission upgrades, energy storage, and utility-scale renewable energy integration.

Homeowner Managing Energy Savings Program (HOMES)

Administering Agency: U.S. Department of Energy (DOE)

Description: The HOMES Program, established under Section 50121 of the Inflation Reduction Act (IRA), provides performance-based rebates for whole-house energy-saving retrofits. Rebates are determined by the percentage of modeled or measured energy savings achieved through eligible home upgrades. The HOMES Program supports Nevada's climate goals by incentivizing residential energy efficiency improvements, thereby reducing greenhouse gas emissions. It also promotes equitable access to energy savings by offering higher rebates to low- and moderate-income households, aligning with the state's objectives.

Key Eligible Activities or Funding Uses: Homeowners and aggregators can receive rebates for comprehensive energy efficiency retrofits that achieve at least 20% energy savings. Eligible improvements include insulation, HVAC systems, windows, and other measures that contribute to whole-house energy reductions.

Low-Income Housing Tax Credit (LIHTC)

Administering Agency: U.S. Department of the Treasury (locally allocated by the Nevada Housing Division)
Description: Established under the Tax Reform Act of 1986, LIHTC provides federal tax credits to developers for the acquisition, rehabilitation, or construction of affordable rental housing for low-income households. LIHTC supports Nevada's climate goals by incentivizing the development of energy-efficient, affordable housing, reducing greenhouse gas emissions, and promoting sustainable communities.

Key Eligible Activities or Funding Uses: Development or rehabilitation of rental housing projects that reserve a portion of units for low-income tenants, with potential integration of energy-efficient designs and renewable energy systems.

Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT) Program

Administering Agency: U.S. Department of Transportation (DOT)
Description: Authorized by the Bipartisan Infrastructure Law, PROTECT provides funding to enhance the resilience of surface transportation systems against natural hazards, including climate change impacts. PROTECT enables Nevada to strengthen transportation infrastructure, ensuring continued operation during extreme weather events and contributing to the state's climate adaptation strategies.

Key Eligible Activities or Funding Uses: Planning and implementation of projects that improve the resilience of highways, transit systems, and other transportation assets, including the use of natural infrastructure solutions.

Urban and Community Forestry Grant Program

Administering Agency: U.S. Department of Agriculture (USDA) Forest Service

Description: This program provides financial and technical assistance to support the development and management of urban and community forests, aiming to improve environmental quality and human health. By expanding urban tree canopies, the program helps Nevada mitigate urban heat islands, sequester carbon, and enhance the resilience of communities to climate change.

Key Eligible Activities or Funding Uses: Tree planting, maintenance, and education initiatives; development of urban forestry plans; and projects that promote equitable access to green spaces.

D.1.2 State Regulations, Programs, Policies, and Plans

Legislation and Executive Action

Cooperative Agreement Authority, Nevada Revised Statutes (NRS 277.180)

Branch of Government: Nevada State Legislature

Description: NRS 277.180 authorizes public agencies in Nevada to enter into cooperative agreements for the joint exercise of powers, including the provision of services and infrastructure projects. This statute enables collaborative efforts among state and local agencies to implement climate-related initiatives, such as renewable energy projects and sustainable transportation systems.

Key Eligible Activities or Funding Uses: : Adoption of legislation that directs the development and management of programs that address climate change mitigation and adaptation.

Executive Order 2023-007

Branch of Government: Office of the Governor, State of Nevada

Description: Executive Order 2023-007 outlines Nevada's energy policy direction, emphasizing a balance between environmental goals, economic growth, energy reliability, and affordability. It marks a shift toward a more "all-of-the-above" energy strategy.

Key Eligible Activities or Funding Uses: Develop state policies and priorities, direct executive branch agencies in implementing those policies, and oversee the management of state budgets as approved by the Legislature.

Air Pollution Control (NRS 445B)

Administering Agency: Nevada Division of Environmental Protection

Description: NRS 445B establishes the legal framework for controlling air pollution in Nevada, including the authority to regulate air pollution and administer air quality programs. It does not authorize NDEP to independently develop or implement GHG policy, instead, NDEP's role is to support policymakers with technical expertise, emissions inventories, and regulatory recommendations to inform state-level decisions on climate and energy policy.

Key Eligible Activities or Funding Uses: Development and enforcement of air quality regulations, monitoring of emissions, and implementation of pollution control measures.

Energy Policy (NRS 701)

Administering Agency: Nevada Governor's Office of Energy

Description: NRS 701 outlines the state's energy policy, emphasizing energy conservation, renewable energy development, and the promotion of energy efficiency. The statute guides the state's approach to energy management, aligning with climate goals by encouraging sustainable energy practices and reducing reliance on fossil fuels.

Key Eligible Activities or Funding Uses: Implementation of energy efficiency programs, support for renewable energy projects, and development of energy conservation initiatives.

Nevada Clean Energy Fund (NRS 701B)

Administering Agency: Nevada Clean Energy Fund

Description: NRS 701B establishes the Nevada Clean Energy Fund, designed to provide financing for clean energy projects, including energy efficiency, renewable energy, and energy storage initiatives. The fund supports the deployment of clean energy technologies, contributing to emission reductions and the advancement of Nevada's climate objectives.

Key Eligible Activities or Funding Uses: Financing for qualified clean energy projects, including loans and other financial instruments to support energy improvements.

Senate Bill 254 – 2019 Nevada GHG Emissions Targets Bill (SB254)

Administering Agency: Nevada Department of Conservation and Natural Resources (DCNR)

Description: SB254 requires the DCNR to prepare and publish an annual inventory of statewide greenhouse gas emissions and projections, establishing a framework for monitoring and reducing emissions over time. The bill provides a data-driven foundation for setting and tracking progress toward emission reduction targets, informing policy decisions to address climate change.

Key Eligible Activities or Funding Uses: Data collection and analysis of emissions across sectors; development of strategies and policies to achieve emission reduction goals.

Senate Bill 358 (2019)

Administering Agency: Nevada Public Utilities Commission (PUCN)

Description: SB358 updates and strengthens Nevada's Renewable Portfolio Standard, increasing the required percentage of renewable energy in the state's electricity mix to 50% by 2030. The legislation accelerates the state's shift toward renewable energy, contributing to greenhouse gas emission reductions and supporting clean energy job growth.

Key Eligible Activities or Funding Uses: Investment in renewable energy generation and infrastructure; compliance programs for utilities to meet RPS requirements.

Programs

Clean Trucks and Buses Incentive Program

Administering Agency: Nevada Department of Environmental Protection (NDEP)

Description: Established through AB184 (2023) and supported by the federal Carbon Reduction Program (23 U.S.C. § 175), the Clean Trucks and Buses Incentive Program provides financial incentives to accelerate the transition to zero-emission medium- and heavy-duty vehicles. Beginning in 2024, Once implemented, the program will offer vouchers to replace older diesel and gasoline trucks and buses with zero-emission vehicles (ZEVs), reducing greenhouse gas emissions and improving air quality in Nevada’s communities.

Key Eligible Activities or Funding Uses: Purchase or lease of new zero-emission medium- and heavy-duty trucks and buses, infrastructure needed to support vehicle deployment (e.g., charging stations), and scrappage of older high-emission vehicles.

2024 International Energy Conservation Code (IECC)

Administering Agency: Nevada Governor’s Office of Energy (GOE)

Description: The IECC sets minimum energy efficiency standards for residential and commercial buildings, aiming to reduce energy consumption and greenhouse gas emissions. In March 2025, the State adopted the 2024 IECC. Adoption supports Nevada's goals to improve building energy performance, lower emissions, and promote sustainable construction practices statewide.

Key Eligible Activities or Funding Uses: Implementation of energy-efficient building designs, materials, and systems in new construction and major renovations.

Commercial Property Assessed Clean Energy (C-PACE)

Administering Agency: Nevada Governor's Office of Energy (GOE)

Description: C-PACE is a financing mechanism that enables commercial property owners to finance energy efficiency, renewable energy, and water conservation projects through a voluntary assessment on their property tax bill. C-PACE facilitates the implementation of energy-saving projects in commercial buildings, contributing to Nevada's emission reduction and energy efficiency objectives.

Key Eligible Activities or Funding Uses: Installation of energy-efficient HVAC systems, solar panels, insulation, lighting upgrades, and water conservation measures.

Home Energy Retrofit Opportunities for Seniors (HEROS)

Administering Agency: Nevada Governor's Office of Energy (GOE) and Nevada Housing Division (NHD)
Description: A Nevada state program that provides no-cost energy efficiency upgrades to income-qualified seniors to improve comfort, lower utility bills, and reduce energy use. HEROS directly supports climate mitigation and energy affordability by lowering emissions from residential energy use and helping vulnerable populations adapt to extreme temperatures.
Key Eligible Activities or Funding Uses: Eligible improvements include insulation, efficient HVAC systems, lighting upgrades, weatherization, and health and safety repairs.

Nevada Electric Highway

Administering Agency: Nevada Governor's Office of Energy (GOE)

Description: The Nevada Electric Highway is a collaborative initiative aimed at expanding electric vehicle (EV) charging infrastructure along major transportation corridors, facilitating long-distance EV travel across the state. By promoting the adoption of EVs through improved charging accessibility, the program supports the reduction of greenhouse gas emissions from the transportation sector.

Key Eligible Activities or Funding Uses: Installation of EV charging stations along designated highway routes, partnerships with local businesses and utilities to host charging sites.

Key Eligible Activities or Funding Uses: Installation of EV charging stations along highways and in underserved areas, planning and development of EV infrastructure networks.

Nevada Statewide Greenhouse Gas Emissions Inventory and Projections (GHG Inventory)

Administering Agency: Nevada Division of Environmental Protection (NDEP)

Description: The GHG Inventory provides a comprehensive account of greenhouse gas emissions in Nevada, including historical data and future projections across various sectors. The inventory informs policy decisions and tracks progress toward emission reduction targets, serving as a critical tool for climate planning and assessment.

Key Eligible Activities or Funding Uses: Data collection and analysis of emissions from transportation, energy production, industrial processes, and other sources.

Weatherization Assistance Program (WAP)

Administering Agency: Nevada Housing Division

Description: WAP provides energy efficiency improvements to low-income households, aiming to reduce energy bills and enhance home comfort through weatherization measures. The program decreases residential energy consumption and associated emissions, while also addressing energy affordability by assisting vulnerable populations.

Key Eligible Activities or Funding Uses: Insulation installation, sealing of air leaks, heating and cooling system upgrades, and other energy-saving home improvements.

Plans and Policies

One Nevada Transportation Plan

Administering Agency: Nevada Department of Transportation (NDOT)

Description: The One Nevada Transportation Plan is a comprehensive, performance-based long-range transportation plan that outlines the state's goals and strategies for developing and maintaining a safe, efficient, and sustainable transportation system. The plan integrates considerations for reducing transportation-related emissions and enhancing multimodal transportation options, aligning with the state's climate objectives.

Key Eligible Activities or Funding Uses: Transportation infrastructure projects that improve system efficiency, safety, and sustainability; development of public transit and active transportation networks.

Nevada Electric Vehicle Infrastructure Plan (NEVI Plan)

Administering Agency: Nevada Department of Transportation (NDOT)

Description: The NEVI Plan outlines Nevada's strategy for deploying electric vehicle (EV) charging infrastructure along designated corridors, utilizing federal funding from the National Electric Vehicle Infrastructure (NEVI) program. The plan supports the expansion of EV infrastructure, facilitating the transition to zero-emission vehicles and contributing to the state's greenhouse gas reduction targets.

Renewable Portfolio Standard (RPS)

Administering Agency: Nevada Public Utilities Commission (PUCN)

Description: Nevada's RPS mandates that a specified percentage of electricity sold by utilities to retail customers must come from renewable energy sources, with the goal of reaching 50% by 2030. The RPS drives the transition to clean energy, reducing reliance on fossil fuels and lowering greenhouse gas emissions from the power sector.

Key Eligible Activities or Funding Uses: Development and integration of renewable energy projects such as solar, wind, geothermal, and biomass into the state's energy mix.

Statewide Bicycle and Inter-County/Regional Transit Plans

Administering Agency: Nevada Department of Transportation (NDOT)

Description: These plans outline strategies for developing and enhancing bicycle infrastructure and inter-county/regional transit services, promoting multimodal transportation options across Nevada. By encouraging active transportation and public transit use, the plans aim to reduce vehicle miles traveled and associated emissions, contributing to climate mitigation efforts.

Key Eligible Activities or Funding Uses: Construction of bike lanes and trails, expansion of regional transit services, integration of transportation networks to improve connectivity and accessibility.

D.1.3 Local Policies and Plans

Policies and Plans

All-In Clark County Initiative

Administering Entity: Clark County Department of Environment and Sustainability (DES), Clark County

Description: The All-In Clark County initiative is a comprehensive plan to address climate change and promote sustainability across the county. It encompasses both internal operations and community-wide strategies to reduce greenhouse gas emissions and enhance resilience. This initiative serves as the county's roadmap for integrating

sustainability into all aspects of governance and community development, aligning with state and federal climate goals.

Key Activities and Measures:

- Development and implementation of the Community Sustainability and Climate Action Plan
- Establishment of the All-In Regional Climate Collaborative
- Public engagement and education through the Climate Ambassadors program
- Pursuit of funding opportunities such as the EPA's Climate Pollution Reduction Grants

City of Reno – Sustainability and Climate Action Plan (2019–2025)

Administering Entity: City of Reno Sustainability Office

Description: Reno's plan outlines nine strategies to reduce greenhouse gas emissions and promote sustainable practices within the city. It builds upon the 2017 Sustainability Report and aligns with the city's Master Plan. The plan sets measurable goals for emissions reductions and integrates sustainability into city operations and community initiatives.

Key Activities and Measures:

- Implementation of sustainability priorities, including clean and renewable energy, sustainable transportation, and climate resilience
- Community-wide greenhouse gas emissions inventory and monitoring
- Partnerships with organizations like ICLEI for emissions measurement and reporting.

City of Las Vegas – 2050 Master Plan

Administering Entity: City of Las Vegas Planning Department

Description: The 2050 Master Plan provides a comprehensive framework for the city's growth and development, emphasizing sustainability, resilience, and community benefits. It addresses challenges such as climate change, urban heat, and resource conservation. The plan integrates climate considerations into land use, transportation, and infrastructure planning, aiming to reduce emissions and enhance the city's adaptability to climate impacts.

Key Activities and Measures:

- Urban forestry initiatives, including the goal to plant 60,000 trees by 2050
- Development of transit-oriented zoning to support sustainable transportation
- Implementation of strategies to mitigate the urban heat island effect

City of Henderson – All-In Henderson Sustainability & Climate Action Plan

Administering Entity: City of Henderson Community Development and Services Department.

Description: The All-In Henderson plan focuses on building resilience to climate impacts, conserving resources, and improving air quality. It emphasizes community engagement and regional collaboration. The plan aligns with broader regional efforts to address climate change and supports the city's commitment to sustainability and public health.

Key Activities and Measures:

- Expansion of zero-emission vehicle infrastructure
- Water conservation programs
- Development of 250+ miles of trails to promote active transportation
- Community outreach and education initiatives

Washoe County Green Recovery Plan

Administering Entity: Office of the County Manager, Emergency Management Division, Washoe County

Description: The Green Recovery Plan, developed in response to the COVID-19 pandemic, aims to integrate disaster risk reduction measures into the revitalization of livelihoods and economies. It focuses on addressing the physical, mental, and economic health of residents while incorporating lessons learned from the pandemic to better prepare for future challenges. The plan aligns with Nevada's greenhouse gas (GHG) emission reduction targets—28% by 2025, 45% by 2030, and net-zero by 2050. It emphasizes the importance of reducing GHG emissions, enhancing resilience to climate change impacts, and promoting equitable access to resources and infrastructure.

Key Activities and Measures:

- GHG Emissions Reduction: Conducting community-wide GHG inventories, setting reduction targets, and implementing strategies to lower emissions.
- Resilience Enhancement: Developing policies and programs to mitigate climate change impacts such as wildfires, drought, flooding, and extreme heat.
- Food Security: Strengthening food systems to ensure access to healthy foods for all residents.
- Transportation Infrastructure: Investing in equitable, multimodal transportation options to reduce reliance on personal vehicles.
- Urban Forestry: Establishing programs to expand the urban tree canopy, providing environmental and health benefits.

D.2 Governance

D.2.1 State of Nevada

The state government of Nevada operates under a bicameral legislature (Senate and Assembly), an Executive Branch led by the governor strong governor system, and an independent judiciary. The Governor is the chief executive and holds significant authority over state budgeting, agency appointments, executive orders, and veto powers. The Governor can set state climate priorities through executive orders and policy goals.

Legislative Authority is held by the Nevada State Legislature, which enacts state laws, appropriates funding, and authorizes statutory programs and frameworks that support climate, energy, and environmental goals. It can create new regulatory authority, direct agency action, and allocate or restrict funds for climate-related efforts.

Legislative Sessions and Rulemaking

With biennial legislative sessions, climate policy implementation often depends on executive orders, administrative rulemaking, or interim legislative committees between sessions.

The NAC (Nevada Administrative Code) comprises the codified regulations of Nevada's executive branch agencies, including rules related to environmental protection, energy, and public health. The NAC provides the regulatory framework for implementing climate policies and programs, such as emissions standards and renewable energy requirements. Enforcement and compliance with state regulations pertaining to climate change mitigation and adaptation are typically administered by agencies such as NDEP, GOE, and PUCN.

State authority is derived from the Nevada Constitution – which establishes legislative authority, executive powers, and agency responsibilities.

State government may implement greenhouse gas (GHG) reduction measures through:

- Rulemaking and regulation (e.g., emissions standards, energy codes)
- Direct program administration (e.g., incentives, grants, and financing)
- Interagency coordination and planning (e.g., climate strategies, adaptation plans)
- Budgetary appropriations and capital project funding
- Public-private partnerships and federal funding alignment

D.2.2 Local Government

Nevada comprises 16 counties, 19 incorporated cities, and one independent city (Carson City). The most-populated cities are Las Vegas, Henderson, Reno, North Las Vegas, and Sparks.

Counties

County governments function as local governing bodies for each county and are responsible for unincorporated areas. They manage land use planning, infrastructure, zoning, emergency services, and public health services.

County authority is derived from the Nevada Revised Statutes and state constitution, which grant counties authority to adopt ordinances, levy taxes, implement land use policies, and regulate development.

Cities

Cities derive their authority from charters established under Nevada law, either by general law or by special legislative acts. Cities are responsible for municipal services, planning and zoning, building code enforcement, and transportation infrastructure within city boundaries.

Tribal Governments

Nevada is home to 27 federally recognized tribes, each of which exercises sovereign authority and may engage in climate planning and implementation independently or in partnership with state agencies. Tribes may develop their own climate strategies, pursue federal funding, and lead clean energy and resilience initiatives on Tribal lands.

Local governments may implement greenhouse gas (GHG) reduction measures through:

- Building and zoning codes (e.g., requiring energy-efficient construction)
- Transit planning and multimodal transportation investments
- Climate action plans and sustainability offices
- Local utility and fleet electrification programs
- Incentives for solar, energy efficiency, and green infrastructure
- Waste and water conservation programs

D.2.3 Nevada Governance Factors Relevant to Climate Planning

- High Federal Land Ownership: Approximately 87 percent of Nevada land is federally owned, affecting siting for renewable energy, land management, and emissions reductions from federal operations. Coordination with federal agencies (e.g., BLM, USFS, DOE) is essential for statewide climate implementation.
- State Revenue Restrictions: Nevada's constitution and statutes impose limits on how certain revenues can be used—for example, gas tax revenue cannot fund bike/pedestrian infrastructure unless included in highway projects. These restrictions can hinder climate-aligned transportation and land use investments.
- No Dedicated Transit Operations Funding: Nevada is one of four states without a state-level funding stream for urban transit operations, complicating implementation of mode-shift strategies and equitable transit expansion.

D.2.4 Dillon's Rule

Dillon's Rule is a legal doctrine stating that local governments have only those powers expressly granted to them by the state legislature, those necessarily implied by the granted powers, and those essential to their function. In states that follow Dillon's Rule, local authority is limited, and municipalities must seek state authorization for measures beyond explicitly delegated powers.

In Nevada, Dillon's Rule applies broadly, meaning cities and counties operate with authority granted by the Nevada State Legislature. Local governments must often obtain enabling legislation to implement policies or programs that exceed traditional municipal functions.

For example, a Nevada city may not adopt a building energy code stricter than the statewide code unless state law authorizes it. If a city wants to mandate green building standards or require electrification of new construction, it may need state-enabling legislation to do so legally.

Dillon's Rule & Home Rule

In Nevada, Dillon's Rule coexists with limited forms of home rule, creating a mixed governance structure. While Dillon's Rule broadly restricts local authority to powers expressly granted by the state, some Nevada cities—such as Las Vegas and Reno—have charters that provide a degree of home rule, allowing them more autonomy in specific areas.

However, this home rule authority remains constrained. Even charter cities must comply with statewide laws and cannot act in areas where the legislature has established clear, comprehensive regulation. For example, while a city may manage its own utilities or zoning under home rule provisions, it cannot impose stricter environmental or energy regulations than those allowed by the state.

In practice, Dillon's Rule takes precedence, and home rule in Nevada does not grant broad powers for cities to independently adopt aggressive greenhouse gas (GHG) reduction measures. Local governments seeking to implement policies such as net-zero building codes or citywide climate fees must often rely on state-enabling legislation. Thus, understanding the balance between Dillon's Rule and home rule is essential to navigating the legal pathways for local climate measures in Nevada.

Implications for GHG Reduction

Dillon's Rule can constrain climate measures by requiring local governments to obtain state approval before adopting innovative or aggressive emissions-reduction measures. This can delay or limit measures such as implementing zero-emission building mandates,

establishing local clean energy programs, or enacting transportation policies that go beyond state standards. As a result, successful GHG reduction efforts in Nevada often rely on strong state leadership, legislative action, or collaboration between state and local entities to expand local authority. Understanding these legal boundaries is critical to designing feasible, enforceable, and legally compliant climate strategies in Nevada.

D.3 Implementing Entities

Nevada's climate goals require the coordinated effort of a broad range of implementing entities across federal, state, regional, and local levels, as well as strong partnerships with utilities, Tribal Nations, nonprofit organizations, and the private sector. This section identifies and organizes the key actors responsible for executing climate-related policies, programs, and investments.

Each entity included plays a distinct and essential role in advancing Nevada's climate priorities, whether through regulatory authority, financial and technical assistance, infrastructure development, or community-based measures. By mapping out the legal authorities, areas of influence, and planning and policy tools associated with each organization or organization type, this section provides a foundation for understanding who could lead and support implementation of the CCAN measures.

This inventory supports strategic alignment of resources and responsibilities, identifies opportunities for cross-sector collaboration, and highlights the infrastructure and governance capacity needed to achieve emissions reductions and build long-term resilience across Nevada's communities. Additional details on legal power and their climate roles can be found below.

D.3.1 Federal Government

Federal government implementing entities support Nevada's climate efforts by providing funding, technical assistance, and regulatory guidance through agencies such as the U.S. Department of Energy, Environmental Protection Agency, and Department of Transportation. These entities contribute to clean energy deployment, resilience planning, and emissions reduction through programs established under laws such as the Inflation Reduction Act and the Bipartisan Infrastructure Law. The table below summarizes each agency's relevant sectors, authority, and implementation tools.

Table D.1. Federal government implementing entities

Agency	Relevant Sectors	Legal Powers	Enabling Authority	Key Planning and Policy Tools
Bureau of Indian Affairs (BIA)	Natural and Working Lands; Waste and Wastewater	Manages Tribal land, resources, infrastructure	Title 25 of the U.S. Code	Grants and technical assistance for climate resilience and clean energy
Bureau of Reclamation (USBR)	Waste and Wastewater; Natural and Working Lands	Manages water supply, hydropower infrastructure	Reclamation Act of 1902	Funding for conservation, reuse, and adaptation planning
Department of Energy (DOE)	Electricity Generation; Buildings; Industry	Administers energy research, funding, and technical support	DOE Organization Act; Energy Policy Act	CPRG, Section 48C, Better Buildings, RECI
Environmental Protection Agency (EPA)	All Sectors	Regulates air, water, waste; enforces environmental laws	Clean Air Act; Clean Water Act; RCRA	CPRG, GHG inventories, climate planning support
Federal Emergency Management Agency (FEMA)	All Sectors	Administers disaster preparedness and mitigation funding	Stafford Act	BRIC, HMGP, hazard mitigation planning
Federal Highway Administration (FHWA)	Transportation	Oversees transportation infrastructure standards and funding	Title 23 of the U.S. Code	PROTECT grants, multimodal planning, EV support
Internal Revenue Service (IRS)	Buildings; Electricity Generation; Transportation	Administers tax credits for energy and climate programs	Internal Revenue Code (Title 26)	IRA tax credits (e.g., EVs, solar, storage)
U.S. Department of Agriculture (USDA)	Agriculture; Natural and Working Lands; Waste and Wastewater	Oversees conservation and rural development programs	U.S. Farm Bill	EQIP, REAP, soil health, climate-smart programs
U.S. Energy Information Administration (EIA)	Electricity Generation; Industry; Buildings	Collects and publishes energy data and forecasts	DOE Organization Act	Benchmarking, emissions data, energy trends

Agency	Relevant Sectors	Legal Powers	Enabling Authority	Key Planning and Policy Tools
U.S. Forest Service (USFS)	Natural and Working Lands	Manages national forests and supports forest resilience	Forest Service Organic Administration Act	Reforestation, wildfire resilience, forest carbon projects
U.S. Department of Housing and Urban Development (HUD)	Buildings	Administers housing and community development funding	U.S. Housing Act of 1937	CDBG, GRRP, housing retrofits, community resilience

Bureau of Indian Affairs (BIA)

Relevant Sectors: Natural and Working Lands; Waste and Wastewater

Legal Powers: Manages land, natural resources, and infrastructure on Tribal lands and supports Tribal self-determination and environmental stewardship (Title 25 of the U.S. Code – Governs BIA programs and responsibilities).

Relevant Roles

- Provides grants and technical assistance to Tribal Nations for climate resilience, conservation, and clean energy development.
- Collaborates on land restoration, fire management, and infrastructure modernization projects.

Bureau of Reclamation (USBR)

Relevant Sectors: Waste and Wastewater; Natural and Working Lands

Legal Powers: Manages water supply, hydropower generation, and infrastructure in the western U.S. (Reclamation Act of 1902 and subsequent amendments).

Relevant Roles

- Partners with state and local agencies to improve water conservation, drought resilience, and energy-efficient water infrastructure
- Provides funding for water reuse, conservation, and adaptation planning.

Department of Energy (DOE)

Relevant Sectors: Electricity Generation; Buildings; Industry

Legal Powers: Administers national energy research, innovation, and deployment programs (Department of Energy Organization Act of 1977).

Relevant Roles

- Funds renewable energy projects, grid modernization, energy efficiency, and clean tech development.
- Supports distributed energy benefits and workforce initiatives in disadvantaged communities.

Environmental Protection Agency (EPA)

Relevant Sectors: Waste and Wastewater; Industry; Buildings

Legal Powers: Regulates air, water, and hazardous waste under major environmental statutes (Clean Air Act, Clean Water Act, Resource Conservation and Recovery Act).

Relevant Roles

- Administers funding and technical support for emissions reduction, and climate adaptation.
- Supports state and Tribal GHG inventories and climate action planning.

Federal Emergency Management Agency (FEMA)

Relevant Sectors: All Sectors (Resilience-Focused)

Legal Powers: Manages disaster preparedness, response, recovery, and mitigation grants (Robert T. Stafford Disaster Relief and Emergency Assistance Act)

Relevant Roles

- Funds climate resilience planning and infrastructure upgrades through programs like BRIC and HMGP.
- Supports community hazard mitigation strategies and pre-disaster planning.

Federal Highway Administration (FHA)

Relevant Sectors: Transportation

Legal Powers: Oversees federal transportation infrastructure standards and funding (Title 23 of the U.S. Code – Highways)

Relevant Roles

- Administers PROTECT funding for climate-resilient transportation infrastructure.
- Supports electrification, multimodal planning, and emissions-reducing transportation investments.

Internal Revenue Service (IRS)

Relevant Sectors: Buildings; Electricity Generation; Transportation

Legal Powers: Implements tax provisions of federal climate and energy laws (Internal) Revenue Code (Title 26).

Relevant Roles

- Manages clean energy and EV tax credits under the Inflation Reduction Act.
- Supports incentives for renewable energy, building retrofits, and energy storage.

U.S. Department of Agriculture (USDA)

Relevant Sectors: Agriculture; Natural and Working Lands; Waste and Wastewater

Legal Powers: Oversees agriculture, forestry, and rural development programs (Various titles under the U.S. Farm Bill).

Relevant Roles

- Funds climate-smart agriculture, soil health, irrigation efficiency, and rural clean energy projects.
- Provides technical support and grants for carbon sequestration and conservation.

U.S. Energy Information Administration (EIA)

Relevant Sectors: Electricity Generation; Industry; Buildings

Legal Powers: Collects, analyzes, and publishes national energy data and forecasts (Department of Energy Organization Act).

Relevant Roles

- Provides energy consumption, production, and emissions data to support policy development.
- Supports benchmarking and performance tracking for energy-related climate measures.

U.S. Forest Service (USFS)

Relevant Sectors: Natural and Working Lands

Legal Powers: Manages national forests and provides technical and financial assistance for forest management (Forest Service Organic Administration Act and related laws).

Relevant Roles

- Supports wildfire resilience, reforestation, and carbon sequestration on public and private lands.
- Partners with state and local entities to enhance ecosystem services and habitat conservation.

U.S. Housing and Urban Development (HUD)

Relevant Sectors: Buildings

Legal Powers: Administers housing programs and funds development of affordable housing and community infrastructure (U.S. Housing Act of 1937 and related statutes).

Relevant Roles

- Funds energy efficiency and climate resilience upgrades in HUD-assisted housing.
- Administers programs like CDBG and Green and Resilience Retrofit Program (GRRP) that support sustainable communities and housing retrofits.

D.3.2 State Government

State government entities in Nevada play a central role in implementing climate policies through regulation, program administration, planning, and coordination across sectors.

Agencies such as the Governor's Office of Energy, Division of Environmental Protection, and Department of Transportation oversee energy programs, air quality, infrastructure, and transportation planning aligned with the state's climate goals. The table below summarizes each agency's relevant sectors, authority, and implementation tools.

Table D.2 State government implementing entities

Agency	Relevant Sectors	Legal Powers	Enabling Authority	Key Planning and Policy Tools
Bureau of Mining Regulation and Reclamation (BMRR) Subagency of DCNR	Industry; Waste and Wastewater	Regulates mining operations and environmental impacts	NRS Chapter 445A	Mine permitting, reclamation, GHG mitigation oversight
Nevada Clean Energy Fund (NCEF)	Electricity Generation; Buildings; Transportation	Provides loans and credit enhancements for clean energy	NRS Chapter 701B	Green bank financing for clean energy and electrification
Nevada Department of Agriculture	Agriculture; Land and Water Use; Natural Resources	Regulates agricultural practices and conservation programs	NRS Title 50	Climate-smart agriculture, drought resilience, technical assistance
Nevada Department of Conservation and Natural Resources (DCNR)	Natural and Working Lands; Waste and Wastewater; Water	Oversees conservation and environmental programs	NRS Title 26	GHG inventory, adaptation planning, watershed and habitat strategies
Nevada Housing Division (NHD)	Buildings; Affordable Housing; Energy Efficiency	Administers housing and energy retrofit programs	NRS Chapter 319	Weatherization, HEROS, LIHTC, energy efficiency in affordable housing
Nevada Governor's Office of Economic Development (GOED)	Economic Development; Clean Energy; Manufacturing; Transportation	Manages economic incentives and strategic industry partnerships	NRS Chapter 231	Clean tech promotion, workforce development, green investment attraction
Nevada Division of Environmental Protection (NDEP) Subagency of DCNR	Waste and Wastewater; Electricity Generation; Transportation; Industry	Regulates pollution and environmental compliance	NRS Chapters 445A and 445B	GHG inventory, Clean Cars Nevada, emissions regulation, climate grants

Agency	Relevant Sectors	Legal Powers	Enabling Authority	Key Planning and Policy Tools
Nevada Governor's Office of Energy (GOE)	Electricity Generation; Buildings; Transportation	Develops and coordinates energy policy and grants	NRS Chapter 701	Building codes, EV infrastructure, energy efficiency programs
Public Utilities Commission of Nevada (PUCN)	Electricity Generation	Regulates investor-owned utilities	NRS Chapter 703 and 704	Rate regulation, Renewable Portfolio Standard (RPS) and Integrated Resource Plans (IRPs) oversight
State Public Works Division (SPWD)	State-Owned Buildings; Public Infrastructure	Manages state facility construction and renovations	NRS Chapter 341	High-performance building standards, energy retrofits, CIP management
Nevada State Public Charter School Authority	Buildings	Oversees charter schools and facility requirements	NRS Chapter 388A	Energy-efficient school buildings, education outreach
Nevada System of Higher Education (NSHE)	Electricity Generation; Buildings; Industry	Governs public universities and colleges	NRS Chapter 396	Clean energy research, workforce training, innovation hubs
Nevada Transportation Authority (NTA)	Transportation	Regulates passenger carriers and mobility providers	NRS Chapter 706	Fleet electrification, shared mobility regulation, ZEV coordination
Tribal Governments and Tribal Housing Authorities	Energy; Transportation; Land Use; Housing	Sovereign governments with planning and implementation authority	Federal Tribal Recognition	Clean transportation, solar, electrification, ecological restoration

Bureau of Mining Regulation and Reclamation (BMBRR)

Relevant Sectors: Industry; Waste and Wastewater

Legal Powers: Regulates mine permitting, environmental protection, and land reclamation for mining operations in Nevada (NRS Chapter 445A – Includes statutory authority for mining-related environmental oversight).

Relevant Roles

- Ensures that mining operations minimize environmental harm and restore land post-closure.

Nevada Clean Energy Fund (NCEF)

Relevant Sectors: Electricity Generation; Buildings; Transportation

Legal Powers: Provides financial assistance through loans and credit enhancements for clean energy projects and functions as Nevada's green bank to attract public and private investment in clean energy (NRS Chapter 701B – establishes the NCEF and defines its structure, purpose, and funding authority).

Relevant Roles

- Offers financing for energy efficiency, renewable energy, electrification, and clean transportation projects.
- Supports equitable investment in disadvantaged communities and aligns funding with state climate goals.
- Partners with public agencies and private developers to deploy climate-related infrastructure.

Nevada Department of Agriculture

Relevant Sectors: Agriculture; Land and Water Use; Natural Resources

Legal Powers: Regulates agricultural practices, food safety, and animal health; administers conservation and resource management programs; authority established under NRS Title 50 (Agriculture and Animals)

Relevant Roles

- Promotes climate-smart agriculture, including soil health, water conservation, and drought resilience practices.
- Provides technical assistance and educational programs to support sustainable farming and ranching.
- Advances resource stewardship and collaborates with stakeholders to build climate resilience in Nevada's agricultural systems.

Nevada Department of Conservation and Natural Resources (DCNR)

Relevant Sectors: Natural and Working Lands; Waste and Wastewater; Water

Relevant Roles

- Oversees environmental protection, land management, natural resource conservation, and state park administration.
- Coordinates interagency environmental planning and policy across multiple divisions.

Enabling Authority

- Nevada Revised Statutes Title 26 – Governs the administration and structure of DCNR and its divisions.

Relevant Roles

- Develops climate adaptation and resilience strategies for land and water systems.
- Administers state GHG inventory and projections in partnership with NDEP.
- Leads efforts in forest and watershed health, ecological protection, and sustainable resource use.

Nevada Housing Division (NHD)

Relevant Sectors: Buildings; Affordable Housing; Energy Efficiency

Legal Powers: Administers housing finance and development programs; allocates Low-Income Housing Tax Credits (LIHTC); manages the Weatherization Assistance Program (WAP) and Home Energy Retrofit Opportunity for Seniors (HEROS) program

Enabling Authority

- Nevada Revised Statutes (NRS) Chapter 319

Relevant Roles

- Reduces greenhouse gas emissions in the building sector by funding and overseeing energy efficiency retrofits and weatherization for low-income households.
- Incorporates energy efficiency and sustainability standards into affordable housing finance and development initiatives.
- Advances equitable climate measures by ensuring underserved communities benefit from reduced energy costs, improved housing quality, and increased climate resilience.

Nevada Governor's Office of Economic Development (GOED)

Relevant Sectors: Economic Development; Clean Energy; Advanced Manufacturing; Transportation

Legal Powers: Administers state economic development incentives; facilitates public-private partnerships; supports industry recruitment and expansion; authority established under NRS Chapter 231

Relevant Roles

- Promotes growth of clean energy industries and green technologies as part of Nevada's economic diversification strategy.
- Supports climate-aligned sectors such as electric vehicle manufacturing, battery storage, and renewable energy through financial incentives and strategic planning.
- Coordinates with state agencies and private entities to attract climate-forward investments and create green jobs, contributing to Nevada's long-term climate and economic resilience goals.

Nevada Division of Environmental Protection (NDEP)

Relevant Sectors: Waste and Wastewater; Electricity Generation; Transportation; Industry

Legal Powers: Regulates air, water, and land pollution under delegated state and federal authority and enforces environmental permitting, compliance, and monitoring across sectors (NRS Chapter 445A and 445B – establish NDEP's environmental protection authority).

Relevant Roles

- Manages GHG emissions inventory and statewide mitigation planning.
- Coordinates implementation of Clean Cars Nevada, air quality, and mobile source emissions programs.
- Supports renewable energy and clean transportation through grantmaking and regulatory alignment.

Nevada Governor's Office of Economic Development (GOED)

Relevant Sectors: Industry; Electricity Generation; Transportation

Legal Powers: Administers economic development incentives and coordinates statewide economic diversification strategy and partners with businesses to attract investment and expand sustainable industry sectors (NRS Chapter 231 – establishes GOED's structure powers, and functions).

Relevant Roles

- Supports clean energy manufacturing, industrial decarbonization, and green workforce development.
- Promotes innovation and business recruitment aligned with climate resilience and sustainability goals.

Nevada Governor's Office of Energy (GOE)

Relevant Sectors: Electricity Generation; Buildings; Transportation

Legal Powers: Develops and coordinates statewide energy policy and programs and administers grants, rebates, and technical assistance for energy efficiency and renewable energy projects (NRS Chapter 701 – governs energy policy and authorizes GOE's operations).

Relevant Roles

- Oversees building codes, vehicle electrification initiatives, and state climate planning.
- Coordinates with other agencies on grid modernization and clean energy deployment.

State Public Works Division (SPWD)

Relevant Sectors: State-Owned Buildings; Public Infrastructure (State Facilities Only)

Legal Powers: Oversees the planning, design, construction, renovation, and maintenance of buildings and physical infrastructure owned by the State of Nevada; manages the Capital Improvement Program (CIP); conducts facility condition assessments and long-range planning; authority defined under NRS Chapter 341

Relevant Roles

- Advances Nevada's climate goals by integrating energy efficiency, sustainability, and renewable energy features into the design and renovation of state-owned facilities.
- Reduces greenhouse gas emissions from the state building portfolio through implementation of high-performance building standards and energy retrofits.
- Supports state leadership in climate mitigation and resilience by ensuring that public infrastructure investments prioritize environmental performance and long-term sustainability.

Nevada State Public Charter School Authority

Relevant Sectors: Buildings

Legal Powers: Approves and oversees public charter schools in Nevada, including facility requirements (NRS Chapter 388A – Defines authority and responsibilities of the Charter School Authority).

Relevant Roles

- Supports the adoption of high-efficiency, zero-emission facilities in public charter school infrastructure.
- May serve as a partner in outreach and education for school-based climate initiatives.

Nevada System of Higher Education (NSHE)

Relevant Sectors: Electricity Generation; Buildings; Industry

Legal Powers: Oversees public universities and colleges in Nevada and manages statewide higher education assets (NRS Chapter 396 – establishes NSHE's governance and authority).

Relevant Roles

- Conducts research and innovation in clean energy, climate science, and environmental technologies.
- Supports workforce development and training aligned with Nevada's climate goals.

Nevada Transportation Authority (NTA)

Relevant Sectors: Transportation

Legal Powers: Regulates passenger transportation carriers, including taxis, limousines, and transportation network companies (NRS Chapter 706 – defines the structure and authority of the Transportation Authority).

Relevant Roles

- Can support emissions reduction by enabling fleet electrification and regulatory reform for shared mobility.
- Coordinates with agencies on ZEV deployment and low-carbon mobility options.

D.3.3 Regional Entities

Regional entities in Nevada, including Metropolitan Planning Organizations (MPOs), Councils of Governments, and regional utilities, support climate implementation through transportation planning, infrastructure coordination, and energy service delivery. These entities facilitate cross-jurisdictional collaboration and administer programs that influence emissions, land use, and mobility. The table below summarizes each entity's relevant sectors, authority, and implementation tools.

Entity	Relevant Sectors	Legal Powers	Enabling Authority	Key Planning and Policy Tools
Southern Nevada Water Authority (SNWA)	Waste and Wastewater; Natural and Working Lands	Manages regional water supply and conservation	Joint Powers Agreement (1991)	Water reuse, conservation, drought resilience planning
RTC of Southern Nevada	Transportation; Land Use; Air Quality; Public Transit	MPO for Las Vegas Valley; manages regional transportation	NRS Chapter 277A	Transit electrification, complete streets, VMT reduction
RTC Washoe	Transportation; Land Use; Public Transit	MPO for Reno-Sparks region; manages transportation infrastructure	NRS Chapter 277A	Transit expansion, mobility planning, emissions reduction
Tahoe Regional Planning Agency (TRPA)	Land Use; Transportation; Natural Resources; Air and Water Quality	Bistate agency with regulatory power in Lake Tahoe Basin	Interstate Compact (CA/NV/US Congress)	Basin-wide GHG tracking, wildfire resilience, sustainable recreation

Entity	Relevant Sectors	Legal Powers	Enabling Authority	Key Planning and Policy Tools
Truckee Meadows Regional Planning Agency (TMRPA)	Land Use; Housing; Infrastructure; Water Resources	Regional land use planning authority for Reno/Sparks/Washoe	NRS Chapter 278	Climate adaptation in land use, hazard mitigation, sustainability integration

Southern Nevada Water Authority (SNWA)

Relevant Sectors: Waste and Wastewater; Natural and Working Lands

Legal Powers: Manages regional water resources, conservation programs, and long-term water planning for Southern Nevada (Joint Powers Agreement – Established in 1991 by member water agencies to manage water supply and conservation).

Relevant Roles

- Implements water conservation and reuse programs that reduce energy and emissions.
- Plays a central role in long-term drought resilience and resource adaptation planning.

Regional Transportation Commission of Southern Nevada (RTC of Southern Nevada)

Relevant Sectors: Transportation; Land Use; Air Quality; Public Transit

Legal Powers: Acts as the MPO for the Las Vegas Valley; authorized under NRS Chapter 277A to plan, fund, and operate regional transportation systems and infrastructure

Relevant Roles

- Leads transportation electrification and transit investment to reduce GHG emissions.
  Implements complete streets and bike/pedestrian infrastructure
- Aligns transportation planning with Southern Nevada's sustainability and air quality goals.

Regional Transportation Commission of Washoe County (RTC Washoe)

Relevant Sectors: Transportation; Land Use; Public Transit

Legal Powers: Serves as the MPO for the Reno-Sparks metropolitan area; authorized to plan, build, and manage transit and road projects under NRS Chapter 277A

Relevant Roles

- Reduces VMT and vehicle emissions through transit expansion and electrification.
- Promotes multimodal mobility and compact land use.

- Coordinates transportation planning with climate resilience goals in Washoe County.

Tahoe Regional Planning Agency (TRPA)

Relevant Sectors: Land Use; Transportation; Natural Resources; Air and Water Quality

Legal Powers: Interstate compact agency for the Lake Tahoe Basin, created by California, Nevada, and Congress

Relevant Roles

- Implements basin-wide climate strategies including emissions tracking, wildfire resilience, and sustainable recreation.
- Incorporates climate measures into land use regulation, transportation planning, and environmental restoration.
- Leads integrated climate and ecosystem planning across the bistate region.

Truckee Meadows Regional Planning Agency (TMRPA)

Relevant Sectors: Land Use; Housing; Infrastructure; Water Resources

Legal Powers: Regional land use planning authority for Reno, Sparks, and Washoe County under NRS Chapter 278

Relevant Roles

- Incorporates climate adaptation, hazard mitigation, and resource conservation into long-range planning.
- Supports development patterns that reduce emissions and improve sustainability.
- Aligns land use policy with infrastructure and natural resource constraints under future climate scenarios.

D.3.4 Utilities

Utilities in Nevada, including investor-owned, cooperative, and publicly owned providers, are key implementers of energy-related climate strategies through power generation, grid management, and customer programs. They influence emissions through decisions on resource planning, infrastructure investments, and demand-side management. The table below summarizes each utility's relevant sectors, authority, and implementation tools.

Entity	Relevant Sectors	Legal Powers	Enabling Authority	Key Planning and Policy Tools
NV Energy	Electricity Generation; Buildings; Transportation	Investor-owned utility regulated by PUCN	PUCN Regulatory Authority	Utility-scale renewables, IRP, TOU rates, EV infrastructure
Valley Electric Association (VEA)	Rural Energy; Transportation	Member-owned cooperative regulated by PUCN	PUCN; Cooperative Governance	Community solar, distributed energy, rural EV support
Overton Power District No. 5	Rural Energy	Public utility district under Nevada state law	State Statute	Grid modernization, energy efficiency, rural electrification
Wells Rural Electric Company (WREC)	Rural Energy; Agriculture; Transportation	Member-owned electric cooperative	Cooperative Governance	Smart grid upgrades, ag electrification, efficiency programs
Mt. Wheeler Power	Rural Energy; Residential; Commercial	Electric cooperative serving central/eastern Nevada	Cooperative Governance	Energy efficiency, education, renewable partnerships

NV Energy

Relevant Sectors: Electricity Generation; Buildings; Transportation

Legal Powers: Investor-owned utility regulated by the Public Utilities Commission of Nevada (PUCN); serves ~90% of Nevada

Relevant Roles

- Drives decarbonization through utility-scale solar, geothermal, and battery storage projects.
- Implements clean energy programs such as Time-of-Use rates, Demand Response, and EV charging infrastructure.

- Supports state climate targets through Integrated Resource Planning (IRP) aligned with Nevada's Renewable Portfolio Standard (RPS) and carbon reduction goals.

Valley Electric Association (VEA)

Relevant Sectors: Rural Energy; Transportation

Legal Powers: Member-owned electric cooperative serving southern Nevada; operates under cooperative principles and regulated by PUCN

Relevant Roles

- Early adopter of community solar and energy storage projects.
- Invests in distributed energy resources and EV charging to support rural electrification and emissions reduction.
- Engages members in energy efficiency and load management programs.

Overton Power District No. 5

Relevant Sectors: Rural Energy

Legal Powers: Publicly owned utility district established under Nevada state law; serves northeastern Clark County and Lincoln County

Relevant Roles

- Explores renewable energy opportunities to stabilize rural energy costs.
- Implements grid modernization and energy efficiency programs in partnership with state and federal agencies.
- Supports electrification and reliability in rural, climate-vulnerable communities.

Wells Rural Electric Company (WREC)

Relevant Sectors: Rural Energy; Agriculture; Transportation

Legal Powers: Member-owned electric cooperative serving northeastern Nevada; governed by a board of member-customers

Relevant Roles

- Pursues distributed energy and smart grid upgrades to improve resilience.
- Supports rural electrification of transportation and agriculture.
- Provides energy efficiency incentives for members to reduce consumption and emissions.

Mt. Wheeler Power

Relevant Sectors: Rural Energy; Residential; Commercial

Legal Powers: Electric cooperative serving central and eastern Nevada and parts of Utah; governed by members and local board

Relevant Roles

- Supports clean energy through energy efficiency and community education.
- Explores renewable project partnerships and grid resilience upgrades.
- Ensures access to affordable, sustainable energy in remote and frontier areas.

D.3.5 Non-Governmental Entities

Non-governmental entities, including nonprofits, community-based organizations, academic institutions, and private sector partners, support climate implementation in Nevada through outreach, technical assistance, project development, research, and investment. These organizations often play a bridging role between government programs and community needs, helping to advance equitable, place-based climate solutions. The table below summarizes each entity's relevant sectors, authority, and implementation tools.

Entity	Relevant Sectors	Legal Powers	Enabling Authority	Key Planning and Policy Tools
Community-Based Organizations (CBOs)	Community Outreach; Housing; Transportation; Energy	Deliver programs and advocacy for underserved populations	Nonprofit Status (IRS 501(c)(3))	Outreach, workforce development, shared mobility, solar, CLTs
Universities, Research Institutes, and Higher Education	Agriculture; Energy; Environment	Provide research and technical assistance	Nevada System of Higher Education (NSHE)	Climate-smart agriculture, CCUS, monitoring, workforce training
Producer Networks & Farm Bureaus	Agriculture; Natural Resources	Organize and advocate for agricultural producers	Nonprofit Associations	Peer learning, policy advocacy, climate-smart ag participation
Conservation Districts	Agriculture; Land Management; Restoration	Support sustainable land practices and coordinate with agencies	State-chartered entities	Technical assistance, restoration projects, resilience programs

Entity	Relevant Sectors	Legal Powers	Enabling Authority	Key Planning and Policy Tools
Chambers of Commerce & Trade Associations	Buildings; Industry; Transportation	Promote business engagement in climate solutions	Nonprofit Membership Associations	Energy upgrades, retrofits, contractor training, sustainability outreach
Nevada Rural Development Council & Regional Development Authorities	Economic Development; Housing; Infrastructure	Support rural economic resilience and planning	State-chartered organizations	Access to financing, technical assistance, local implementation
Professional and Trade Associations	Buildings; Energy; Workforce	Support workforce development and compliance	Nonprofit Membership Associations	Training, certification, code interpretation, program implementation

Community-Based Organizations (CBOs)

Examples: Green Our Planet, CHISPA Nevada, Dream Big Nevada, Sierra Club Toiyabe Chapter, Make the Road Nevada

Relevant Roles

- Conduct outreach and education in underserved communities (e.g., EV adoption, carsharing, urban greening)
- Co-design infrastructure and services with residents
- Deliver workforce development, energy efficiency programs, and first/last-mile transit solutions
- Support equitable deployment of shared mobility, rooftop solar, and retrofit initiatives
- Lead Community Land Trust formation and housing stewardship

Universities, Research Institutes, and Higher Education

Examples: University of Nevada, Reno (UNR) Extension & Desert Research Institute (DRI)

Relevant Roles

- Provide technical assistance, scientific research, field trials, and public education for climate-smart agriculture, carbon sequestration, and CCUS
- Support data collection, modeling, and monitoring for air quality, soil health, and ecological restoration
- Deliver training and workforce development in clean energy, building performance, and climate resilience

Producer Networks & Farm Bureaus

Examples: Nevada Farm Bureau Federation, Western Sustainable Agriculture Research and Education (WSARE)

Relevant Roles

- Facilitate peer learning and voluntary participation in climate-smart agriculture programs
- Advocate for supportive policy and funding
- Serve as intermediaries between state agencies and rural producers

Conservation Districts

Examples: Nevada Association of Conservation Districts, Carson Valley Conservation District, Southern Nye County Conservation District

Relevant Roles

- Deliver technical assistance and support to farmers and ranchers for sustainable land management
- Coordinate grazing and restoration efforts in partnership with state and federal agencies
- Implement local ecological restoration and climate resilience strategies

Chambers of Commerce & Trade Associations

Examples: Las Vegas Chamber of Commerce, Nevada Builders Alliance, Associated General Contractors – Nevada Chapter

Relevant Roles

- Promote energy upgrades and sustainability programs to commercial property owners
- Collaborate on outreach for retrofits, solar, and demand-side management
- Support training and technical assistance in HVAC, building codes, and contractor compliance

Nevada Rural Development Council & Regional Development Authorities

Examples: Nevada Rural Development Council, Northeastern Nevada Regional Development Authority (NNRDA), Western Nevada Development District (WNDD)

Relevant Roles

- Coordinate economic and workforce development programs
- Assist rural communities in accessing financing, planning tools, and training

- Partner with CBOs and agencies to implement equitable clean energy and resilience projects

Professional and Trade Associations

Examples: Nevada Chapter of the International Code Council (ICC), Southwest Energy Efficiency Project (SWEEP), Nevada HVAC Association

Relevant Roles

- Deliver training and certification programs (e.g., for heat pump installation, energy retrofits)
- Help interpret and implement new building codes and performance standards
- Serve as implementation partners for energy efficiency and electrification programs

D.4 Implementation Mechanisms

This section identifies the primary tools that implementing entities, including state agencies, local governments, Tribes, utilities, community-based organizations, and private sector partners, can use to carry out the measures of the CCAN. These mechanisms represent the operational core of climate action, ranging from financial and regulatory levers to governance, technical support, and collaboration. Understanding how these tools function and who can deploy them helps clarify pathways for measures and highlights opportunities to scale, sustain, and adapt climate strategies across Nevada.

D.4.1 Financial Incentives and Funding Tools

Financial tools such as grants, rebates, loans, and tax incentives are central to supporting climate action investments and lowering upfront upgrade costs for households, governments, and businesses.

Grants and Rebates

Provide direct financial support to households, businesses, local governments and nonprofits for climate measures.

- *Potential Implementation Partners:* Federal and State agencies (e.g., NDEP, GOE, NCEF), local governments, utilities
- *Beneficiaries:* Households, nonprofits, CBOs, Tribes, small businesses

Tax Incentives

Offer tax credits, deductions or exemptions to reduce upfront costs of eligible technologies and measures. Many of the resources and targeted programs of the IRA and BIL are delivered via tax credits, with energy projects notably serviced by the Investment Tax

Credit (ITC) and Production Tax Credit (PTC) and individuals often benefiting from consumer tax credits for appliances or home-based infrastructure, like solar arrays.

- *Potential Implementation Partners:* Federal Government, State Legislature (enabling authority), Nevada Department of Taxation
- *Beneficiaries:* Private sector developers, building owners, residents

Low-Interest Loans and Revolving Funds

Provide access to capital for clean energy and energy efficiency projects.

- *Potential Implementation Partners:* NCEF, GOE, local governments (if authorized), community development financial institutions (CDFIs)
- *Beneficiaries:* Building owners, Tribes, CBOs, nonprofits

Performance-Based Incentives

Links funding to measurable outcomes like GHG reductions or energy savings.

- *Potential Implementation Partners:* NDEP, utilities (via PUCN), GOE
- *Beneficiaries:* Program implementers, property owners, industrial users

D.4.2 Regulatory and Policy Mechanisms

Policy tools set enforceable standards, streamline clean energy deployment, and align regulatory frameworks with climate goals.

Codes and Standards

Update building codes, appliance standards and fuel standards to align with climate goals.

- *Potential Implementation Partners:* GOE (state code adoption), SPWD (public facilities), local governments (enforcement), PUCN (appliance/fuel standards)

Permitting Reform

Streamline permitting processes for clean energy and EV infrastructure installations.

- *Potential Implementation Partners:* Local governments, NDOT, State Fire Marshal, utility commissions

Mandates and Requirements

Adopt enforceable policies or regulations that set targets and timelines for climate measures.

- *Potential Implementation Partners:* Nevada Legislature (statutory authority), PUCN, GOE, NDEP
- *Affected Entities:* Private companies, building owners, fleet operators

D.4.3 Planning and Governance

Governance strategies coordinate climate measures across agencies and ensure alignment with land use, transportation, energy, and community benefit goals.

Integrated Planning Requirements

Require climate measures be integrated into land-use, transportation, energy and adaptation planning.

- *Potential Implementation Partners:* MPOs, local/regional planning agencies, NDOT, GOE

Cross-Sector Coordination

Establish task forces or working groups to align state, local, Tribal and private-sector efforts.

- *Potential Implementation Partners:* Governor's Office, GOE, NDEP, state-local-Tribal task forces

Tribal and Low-Income and At Risk Communities Engagement

Co-develop programs and implementation approaches that address their priorities in alignment with climate measures.

- *Potential Implementation Partners:* Tribes, CBOs, state agencies

Climate Community Benefits Frameworks

Embed community benefits in all climate measures policies and programs.

- *Potential Implementation Partners:* GOE, NDEP, local governments, Tribes, CBOs

D.4.4 Technical Assistance and Capacity Building

Capacity-building tools equip local governments, Tribes, and community organizations with the knowledge and support needed to implement projects.

Guidance and Toolkits

Provide resources for local governments, Tribes and other stakeholders to develop and implement climate projects.

- *Potential Implementation Partners:* GOE, NSHE, nonprofit intermediaries (e.g., SWEEP), regional planning organizations

Community-Based Support

Offer direct planning support to community organizations advocating for Tribes and low income and at-risk communities.

- *Potential Implementation Partners:* State-funded consultants, local nonprofits, Tribal consortia

Workforce Development

Expand training, apprenticeships and job placement programs aligned with CCAN measures.

- *Potential Implementation Partners:* NSHE, DETR, GOE, labor unions, training organizations
- *Beneficiaries:* Job seekers, students, dislocated workers, underrepresented communities

D.4.5 Partnerships and Collaboration

Cross-sector collaboration enables innovation, pilot testing, and resource pooling for high-impact implementation.

Public-Private Partnerships

Collaboration between government and the private sector to deliver public services, infrastructure or innovation.

- *Potential Implementation Partners:* State/local governments, GOED, utilities, infrastructure developers

Demonstration Projects

Develop pilot projects with government, industry and educational institutions.

- *Potential Implementation Partners:* NSHE, DRI, local governments, industry associations, GOE

Innovation/Entrepreneurship Accelerators

Support early-stage technologies and startups through incubators and testbeds.

- *Potential Implementation Partners:* Universities, GOED, incubators (e.g., StartUpNV), research centers

Utility and/or Renewable Energy Developer Collaboration

Coordinate large-scale deployment with key actors.

- *Potential Implementation Partners:* NV Energy, Southwest Gas, solar/wind developers, local governments, GOE

D.4.6 Market Development and Procurement

Market-based mechanisms and strategic procurement can expand access to clean technologies and drive down costs.

Public Procurement Standards

Use state/local purchasing power to catalyze demand for low-carbon products and services.

- *Potential Implementation Partners:* State agencies (e.g., SPWD), local governments

Green Purchasing Requirements

Require low-carbon materials in public construction and operations.

- *Potential Implementation Partners:* State purchasing officers, PUCN (if utility-related), local ordinances

Bulk Purchasing

Pool purchasing power to reduce costs and expand access.

- *Potential Implementation Partners:* Local governments, school districts, Tribal governments, rural utilities and purchasing cooperatives, regional entities such as MPOs/RTCs

D.4.7 Monitoring, Evaluation and Transparency

Tracking, evaluation, and transparency are essential for ensuring accountability, continuous improvement, and public trust in climate implementation.

Public Reporting

Track and publish implementation, emissions and community outcomes and progress toward goals.

- *Potential Implementation Partners:* GOE, NDEP, PUCN, MPOs, local governments

Evaluation Frameworks

Build in opportunities for reviewing measures and processes to improve or correct the plan's course.

- *Potential Implementation Partners:* State agencies, independent evaluators, universities, external consultants

D.5 Funding Opportunities

Achieving Nevada's climate goals will require sustained and strategic investment across public, private and philanthropic sectors. Implementation will hinge on the ability to mobilize and manage funding effectively. Measures will rely on funding sources and financing mechanisms.

Funding sources are financial resources such as federal grants, state general funds, taxes or private investment. Financing mechanisms are tools to attract and distribute those resources, including revolving loan funds, public-private partnerships, and on-bill financing.

Understanding and aligning sources and mechanisms will enable Nevada to identify viable financing pathways for each climate measure, tailoring implementation strategies to available resources and administrative capacity.

At the federal level, the Infrastructure Investment and Jobs Act (IIJA) and Inflation Reduction Act (IRA) created significant new funding opportunities. However, the long-term availability of federal climate funds is uncertain. This makes it critical to vary funding and financing, combining federal opportunities with flexible state and local resources and leveraging private investment where possiblD.

D.5.1 Funding and Financing Mechanisms

Grants

Grants are a vital source of funding in Nevada, particularly for local governments, Tribes, and community-based organizations. Nevada agencies, such as GOE, NHD, and NDOT, frequently compete for or administer federal grants from programs like the Inflation Reduction Act (IRA), the Bipartisan Infrastructure Law (BIL), and other EPA programs.

At the state level, grant programs like HEROS and LISEP provide no-cost retrofits and solar installations to eligible households. Local governments and nonprofits also access philanthropic and regional grants for urban forestry, transit planning, and resilience building.

Taxes

Taxes can generate revenue directly from residents through property taxes, sales taxes, utility charges, vehicle registration fees, fuel taxes, and similar mechanisms. In Nevada, local governments may require voter approval to institute or increase taxes. Additionally, state law restricts the use of certain taxes. For example, motor fuel taxes must primarily fund highway projects, limiting their use for bike/pedestrian infrastructure unless explicitly tied to a road improvement.

Nevertheless, tax revenues can support a wide array of climate-related efforts. For example, Clark and Washoe Counties have used sales tax revenue to fund regional transit projects. Potential applications include energy upgrades in public buildings, water conservation measures, renewable energy programs, and urban greening initiatives. Special assessment districts and Tax Increment Financing (TIF) may be used to fund clean energy or resilience infrastructure by capturing future increases in property values.

Fees

Fees are specific charges on activities, services, or resources and may be levied by state agencies, local governments, utilities, and special districts. In Nevada, fees must align with legal requirements related to proportionality and specific use. Examples include building permit fees to fund compliance with the state's energy code or vehicle registration fees that support clean transportation investments.

Utilities may charge program-specific fees, such as demand-side management surcharges to fund energy efficiency programs. While fees can serve as a stable revenue stream for implementation, their design must consider how to avoid disproportionate impacts on low-income households.

Budget Allocations

State and local budget allocations in Nevada are constrained by constitutional requirements for balanced budgets and voter-approved limits on debt or tax increases. However, general fund allocations can provide flexible funding for climate priorities.

For example, the Governor's Office of Energy (GOE) and the Department of Conservation and Natural Resources (DCNR) have received state appropriations to implement clean energy and resilience programs. Budget allocations can support a broad range of measures, including municipal fleet electrification, urban forestry, or public engagement campaigns.

Loans and Finance Instruments

Loans provide upfront capital that is repaid over time, often at low or subsidized interest rates. Loans may come from state revolving loan funds, federal loan programs, green banks or private lenders. Borrowers, including governments, businesses or even households, can use loans as a financing mechanism to implement climate projects without the need for immediate capital. Loans can be structured with flexible repayment terms, tied to project performance (e.g., energy savings), or even bundled with technical assistance.

Federally funded loan programs available to states include the following:

- The Loan Programs Office is a federal financing program that supports large-scale energy and infrastructure projects. The program is managed and administered by the Department of Energy.[25]

- State Energy Program Funding provides grants to states to assist in designing, developing and implementing renewable energy and energy efficiency programs. The funds are administered through the state's energy office. Funding is authorized through 2026.[26]

- EPA's Clean Water State Revolving Funds provide funding and guidance to states to provide low-cost financing for water quality infrastructure projects. States administer the program, making lending decisions and setting priorities.[27]

State and local governments, utilities, nonprofits and, in some cases, private property owners are eligible to access and administer loan-based programs. For example, a revolving loan fund (RLF) is a capital source that provides loans to eligible projects with the repayments and interest replenishing and growing the fund over time. State and local governments can establish RLFs with seed funding from grants, federal funding, utility surcharges, bonds or budget line items and administer the funds based on eligible uses (e.g., building retrofits, renewable energy installations, clean transportation, etc). This is just one example of how loans work. Criteria and eligibility vary. A city might use a state-supported revolving loan fund to upgrade municipal buildings with energy efficiency retrofits, while a rural cooperative might use U.S. Department of Agriculture (USDA) loan support to finance distributed solar. States can also create their own green banks to administer low-interest loans and loan guarantees for clean energy projects. Property Assessed Clean Energy (PACE) financing is another example that allows property owners (residential or commercial) to finance energy efficiency or renewable energy upgrades and repay the loan via a special assessment on their property tax bill.

Loans can fund a wide range of climate measures, including energy efficiency upgrades, renewable energy installations for homes and businesses, electric vehicle infrastructure, water conservation retrofits and climate-resilient infrastructure. While loans must be repaid, they can unlock upfront capital and deliver long-term savings for borrowers at every level.

Bonds

State and local governments can use bonds to raise capital for large-scale infrastructure investments. As a funding source, bonds are essentially loans issued by a public entity (like a city, county or state government) to investors, who are repaid with interest over

[25] Department of Energy, Loan Programs Office, accessed May 2025, https://www.energy.gov/lpo/loan-programs-office
[26] Department of Energy, State Energy Program (SEP) Funding, accessed May 2025, https://afdc.energy.gov/laws/317
[27] Environmental Protection Agency,Clean Water State Revolving Fund (CWSRF), accessed May 2025, https://www.epa.gov/cwsrf

time. As a financing mechanism, bonds allow governments to spread the costs of major projects over many years, making them more affordable and accessible upfront. There are multiple types of bonds:

- General obligation bonds are backed by the full faith and credit of the issuing government.
- Revenue bonds are repaid through the income generated by the funded project (e.g., toll roads or water utilities).
- Green bonds are specifically earmarked for environmentally beneficial projects.

Both state and local governments can issue bonds, although the process typically requires voter approval or legislative authorization. Entities such as municipalities, counties, transit authorities, school districts and special districts (e.g., water, flood control or energy districts) frequently use bonds to fund projects with long lifespans and public benefit. For example, a local government might issue general obligation bonds to upgrade public school HVAC systems for energy efficiency or construct solar-covered parking facilities at civic centers, while a state agency could use revenue bonds to fund new electric vehicle charging networks along highways, with repayment linked to fees or utility revenues.

Bonds are well suited to fund measures that involve capital-intensive infrastructure, such as renewable energy installations (e.g., solar fields, geothermal plants), public transit modernization, large-scale building retrofits and water efficiency projects. Green bonds are particularly aligned with the CCAN measure implementation, as their proceeds are restricted to projects with defined environmental outcomes, and their transparency can build public trust in climate spending. Due to their scale and long-term structure, bonds can play a foundational role in implementing state and local climate plans.

Other

In addition to traditional tools, Nevada may benefit from public-private partnerships (P3s), green banks (like the NCEF), and other innovative financing mechanisms:

- On-bill financing through utilities can help residential or small business customers invest in energy upgrades.
- Tax credits, such as federal Investment Tax Credits (ITCs) or Production Tax Credits (PTCs), remain critical to renewable energy development in Nevada.

Appendix E: Workforce Analysis

O*NET Data on Green Jobs

O*NET, an application from the U.S. Department of Labor, identifies 204 “green occupations.” [28] These occupations include new roles and existing roles with evolving responsibilities and are separated into three broad categories: Green New and Emerging, Green Enhanced Skills and Green Increased Demand.

Table F.1. O*NET Green occupations overview.

Category	Description	Number of Occupations
Green New and Emerging	The impact of green economy activities and technologies is sufficient to create the need for unique work and worker requirements, which results in the generation of new occupations.	78
Green Enhanced Skills	The impact of green economy activities and technologies results in a significant change to the work and worker requirements of an existing O*NET occupation.	62
Green Increased Demand	The impact of green economy activities and technologies results in an increase in employment demand but does not entail significant changes in the work and worker requirements of the occupation.	64

Table F.2. provides a comprehensive list of jobs in green new and emerging occupations, green enhanced skills occupations, and green increased demand occupations.

Table E.2. O*NET Green occupations by category.[29]

Green New and Emerging	Green Enhanced Skills	Green Increased Demand
Automotive engineering technicians	Aerospace engineers	Agricultural inspectors
Automotive engineers	Agricultural technicians	Architectural drafters

[28] O*NET. (2024). Green Occupations. Available at: https://www.onetcenter.org/dictionary/22.0/excel/green_occupations.html.
[29] O*NET. (2024). Green Occupations. Available at: https://www.onetcenter.org/dictionary/22.0/excel/green_occupations.html.

Green New and Emerging	Green Enhanced Skills	Green Increased Demand
Biochemical engineers	Aircraft structure, surfaces, rigging and systems assemblers	Boilermakers
Biofuels processing technicians	Arbitrators, mediators and conciliators	Bus drivers, transit and intercity
Biofuels production managers	Architects, except landscape and naval	Buyers and purchasing agents, farm products
Biofuels/biodiesel technology and product development managers	Architectural and engineering managers	Cement masons and concrete finishers
Biomass plant technicians	Atmospheric and space scientists	Chemical engineers
Biomass power plant managers	Automotive specialty technicians	Chemical equipment operators and tenders
Brownfield redevelopment specialists and site managers	Bus and truck mechanics and diesel engine specialists	Chemical plant and system operators
Chief sustainability officers	Civil engineers	Chemical technicians
Climate change analysts	Construction and building inspectors	Chemists
Compliance managers	Construction laborers	Commercial and industrial designers
Electrical engineering technologists	Construction managers	Computer-controlled machine tool operators, metal and plastic
Electromechanical engineering technologists	Continuous mining machine operators	Construction carpenters
Electronics engineering technologists	Electrical engineering technicians	Customer service representatives
Energy auditors	Electrical engineers	Cutting, punching and press machine setters, operators and tenders, metal and plastic
Energy brokers	Electro-mechanical technicians	Dispatchers, except police, fire and ambulance
Energy engineers	Electronics engineers, except computer	Drilling and boring machine tool setters, operators and tenders, metal and plastic

Green New and Emerging	Green Enhanced Skills	Green Increased Demand
Environmental economists	Environmental engineering technicians	Electrical and electronic equipment assemblers
Environmental restoration planners	Environmental engineers	Electrical and electronics repairers, commercial and industrial equipment
Financial quantitative analysts	Environmental science and protection technicians, including health	Electrical power-line installers and repairers
Freight forwarders	Farm and ranch managers	Electricians
Fuel cell engineers	Financial analysts	Electronics engineering technicians
Fuel cell technicians	General and operations managers	Engine and other machine assemblers
Geographic information systems technicians	Geological sample test technicians	Environmental scientists and specialists, including health
Geospatial information scientists and technologists	Geophysical data technicians	Farm and home management advisors
Geothermal production managers	Geoscientists, except hydrologists and geographers	First-line supervisors of agricultural crop and horticultural workers
Geothermal technicians	Hazardous materials removal workers	First-line supervisors of logging workers
Green marketers	Heating and air- conditioning mechanics and installers	First-line supervisors of mechanics, installers and repairers
Hydroelectric plant technicians	Heavy and tractor-trailer truck drivers	First-line supervisors of production and operating workers
Hydroelectric production managers	Industrial engineering technicians	Fish and game wardens
Industrial ecologists	Inspectors, testers, sorters, samplers and weighers	Forest and conservation technicians
Industrial engineering technologists	Landscape architects	Forest and conservation workers
Investment underwriters	Machinists	Helpers — carpenters
Logistics analysts	Maintenance and repair workers, general	Helpers — installation, maintenance and repair workers

Green New and Emerging	Green Enhanced Skills	Green Increased Demand
Logistics engineers	Marketing managers	Hydrologists
Logistics managers	Mechanical engineers	Industrial engineers
Manufacturing engineering technologists	Nuclear engineers	Industrial machinery mechanics
Manufacturing engineers	Nuclear equipment operation technicians	Industrial production managers
Manufacturing production technicians	Nuclear power reactor operators	Industrial safety and health engineers
Mechanical engineering technologists	Occupational health and safety technicians	Industrial truck and tractor operators
Mechatronics engineers	Personal financial advisors	Insulation workers, floor, ceiling, and wall
Methane/landfill gas collection system operators	Pipe fitters and steamfitters	Laborers and freight, stock and material movers, hand
Methane/landfill gas generation system technicians	Plumbers	Locomotive engineers
Microsystems engineers	Power plant operators	Materials scientists
Nanosystems engineers	Public relations specialists	Millwrights
Nanotechnology engineering technicians	Refuse and recyclable material collectors	Mixing and blending machine setters, operators and tenders
Nanotechnology engineering technologists	Reporters and correspondents	Natural sciences managers
Photonics engineers	Roofers	Occupational health and safety specialists
Photonics technicians	Sales representatives, wholesale and manufacturing, technical and scientific products	Operating engineers and other construction equipment operators
Precision agriculture technicians	Separating, filtering, clarifying, precipitating and still machine setters, operators and tenders	Power distributors and dispatchers
Recycling and reclamation workers	Service unit operators, oil, gas and mining	Production, planning and expediting clerks
Recycling coordinators	Sheet metal workers	Railroad conductors and yardmasters

Green New and Emerging	Green Enhanced Skills	Green Increased Demand
Regulatory affairs managers	Shipping, receiving and traffic clerks	Rail-track laying and maintenance equipment operators
Regulatory affairs specialists	Soil and plant scientists	Refrigeration mechanics and installers
Remote sensing scientists and technologists	Soil and water conservationists	Rough carpenters
Remote sensing technicians	Storage and distribution managers	Software developers, systems software
Risk management specialists	Training and development specialists	Solderers and brazers
Robotics engineers	Transportation managers	Stationary engineers and boiler operators
Robotics technicians	Transportation vehicle, equipment and systems inspectors, except aviation	Structural iron and steel workers
Securities and commodities traders	Urban and regional planners	Structural metal fabricators and fitters
Solar energy installation managers	Wholesale and retail buyers, except farm products	Team assemblers
Solar energy systems engineers		Welders, cutters and welder fitters
Solar photovoltaic installers		Zoologists and wildlife biologists
Solar sales representatives and assessors		
Solar thermal installers and technicians		
Supply chain managers		
Sustainability specialists		
Transportation engineers		
Transportation planners		
Validation engineers		
Water resource specialists		
Water/wastewater engineers		

Green New and Emerging	Green Enhanced Skills	Green Increased Demand
Weatherization installers and technicians		
Wind energy engineers		
Wind energy operations managers		
Wind energy project managers		
Wind turbine service technicians