

Nevada Energy Policy Simulator (EPS) Summary Documentation

Estimating Economy-wide Emissions for Nevada

The Nevada Energy Policy Simulator (EPS) accounts for emissions produced in the following sectors: electricity generation, building energy consumption, industrial energy consumption, industrial process emissions, agriculture process emissions, land use change, and transportation.

Our primary sources are federal data sets from the Environmental Protection Agency (EPA), Energy Information Association (EIA), and the National Renewable Energy Lab (NREL). The table below summarizes our data sources and methodology.

► DATA SOURCES

Sector	Subsectors	Source	Methodology	Benchmarking Sources for Comparisons
ELECTRICITY	In-state capacity and generation; out of state imports	For capacity and generation: EIA's Form 923 and EIA's Form 860 For imports/exports: EIA's State Electricity Profiles Table 10 .	Added all utility-owned generation and capacity in-state. No scaling needed. Imports and exports are held constant.	Emissions - EPA "State CO2 Emissions from Fossil Fuel Combustion, 1990-2017" & AEO "State CO2 Emissions from Fossil Fuel Combustion"
BUILDING ENERGY USE	All energy use, all building components, residential and commercial buildings	NREL Electrification Futures Study - Reference Scenario	No scaling needed. NREL reports total energy use by fuel type and demand technology in NV for each year 2017-2050.	Energy Use - EIA's "State Energy Data Systems" 2018 CO2 Emissions - AEO "State CO2 Emissions from Fossil Fuel Combustion"
INDUSTRIAL ENERGY USE	All fuel use for industrial sector	Energy Information Association's Annual Energy Outlook tables on Industrial Energy Use & EIA's "State Energy Data Systems"	Scaled down by Census Data (County Business Patterns) employment by industrial subsector and state compared to national employment by industrial sector	Energy Use - NREL Electrification Futures and EIA's "State Energy Data Systems" Emissions - EPA "State CO2 Emissions from Fossil Fuel Combustion, 1990-2017" & AEO "State CO2 Emissions from Fossil Fuel Combustion"
INDUSTRIAL PROCESS EMISSIONS	Process Emissions	EPA Global Non-CO2 Greenhouse Gas Emissions Projections & Mitigation Potential: 2015-2050	Scaled down US data to state data using a variety of sources, including data from EPA's FLIGHT tool and EPA's State Inventory Tool Output Dataframe	The Center for Climate Strategies' "Nevada Greenhouse Gas Inventory and Forecast"

AGRICULTURE, LAND USE AND FORESTRY	Livestock emissions Natural carbon sinks and sources (LULUCF)	EPA “ State Inventory and Projection Tool ” “ Nevada Statewide Greenhouse Gas Emissions Inventory and Projections ”		Emissions - EPA “ State CO2 Emissions from Fossil Fuel Combustion, 1990-2017 ” & AEO “ State CO2 Emissions from Fossil Fuel Combustion ”
TRANSPORTATION	All energy use, vehicle miles	Energy Information Association’s Annual Energy Outlook tables on Industrial Energy Use & NREL Electrification Futures Study - Reference Scenario	Scaled down US data, using NREL to find the proportion of national vehicle stock and service demand in NV.	Emissions - EPA “ State CO2 Emissions from Fossil Fuel Combustion, 1990-2017 ” & AEO “ State CO2 Emissions from Fossil Fuel Combustion ”

Understanding the Business-as-Usual Projections

The Nevada EPS model includes several built-in reference scenarios. The first is a **business-as-usual (BAU) scenario**, which represents all policy that is currently enacted in Nevada. Once these policies are implemented, they will become part of the **BAU scenario**.

Business-as-Usual: Energy Innovation and RMI built a forecast of Nevada’s economy-wide greenhouse gas emissions through 2050 using publicly available, national models of energy consumption (EIA’s Annual Energy Outlook, NREL’s Electrification Future Study). The BAU Scenario is the model’s foundation, capturing projected changes based on economic growth, technology and cost changes, and existing policy commitments.

SUMMARY OF POLICY ASSUMPTIONS

Sector	BAU Scenario
Electricity	<ul style="list-style-type: none"> Includes Nevada's Renewable Portfolio Standard Assumes all currently planned retirements are completed on time (North Valmy Unit 1 by 2021, Unit 2 by 2025) Energy storage target of 100MW by 2021 (pursuant to Docket No. 17-07014)
Buildings	<ul style="list-style-type: none"> From EIA's Annual Energy Outlook and NREL Assumes some equipment performance improvements over time, based on market data (described here)¹
On-Road Transportation	<ul style="list-style-type: none"> From EIA's Annual Energy Outlook and NREL Includes 2012 Federal Corporate Average Fuel Economy Standards (CAFE) standards (full text via AEO) Federal EV subsidies Economic adoption of EVs²
Industry	<ul style="list-style-type: none"> From EIA's Annual Energy Outlook and NREL Assumes equipment performance improvements over time (described here) Does not include implementation of the Kigali Amendment to the Montreal Protocol.
Land use/Agriculture	<ul style="list-style-type: none"> Agriculture, biomass, and forestry projections
Imports/Exports	<ul style="list-style-type: none"> Imported electricity emissions held constant

Defining Targets shown in the tool

Greenhouse gas reduction target

Rocky Mountain Institute has done a US-wide analysis to define sector level targets consistent with limiting cumulative US greenhouse gas emissions consistent with a global 1.5°C budget. To inform these targets, RMI reviewed both global 1.5°C guidance³ and numerous national decarbonization pathways analyses, with a focus on required action by 2030. The sector-level targets have been translated to state-level benchmarks to guide policy evaluation and discussion. Targets by sector are downscaled from national to state levels using 2019 emissions to allow for disparate emissions trends since 2005 across states. Due to the considerable uncertainties in these analyses, the national and state level sector targets are approximate, and should not be considered equivalent to an

¹ Efficiency improvements are derived from NREL electrification futures study Reference Case. Energy Efficiency policies – including those in Minnesota such as building rebates-- are not explicitly included in the BAU.

² Electric vehicle adoption in the BAU case is based on economic adoption modeled in the EPS, with more details available here: <https://us.energypolicy.solutions/docs/transportation-sector-main.html>. EPS transportation data, such as vehicle prices, is largely taken from EIA, and the resulting EV adoption curve rates are similar to other studies, including the “Electric Vehicle Outlook 2020”: <https://about.bnef.com/electric-vehicle-outlook/#toc-viewreport>.

³ See IPCC [Global Warming of 1.5°C](#) and [UNEP Emissions Gap Report 2019](#)

optimum state-by-state decarbonization assessment. State-level assessments may identify more cost- and politically effective paths that reduce emissions more quickly. RMI will provide additional information on the target calculations in a subsequent document.

Example Climate Mitigation Scenarios

US 1.5 Degree Scenario

Energy Innovation developed a US 1.5 Degree Scenario, which is designed to put the US, nationally, on an emissions trajectory broadly consistent with limiting global warming to 1.5°C by 2100. This national scenario has been downscaled to Nevada, adjusting for differences in the state technology mix compared to the national technology mix. This policy scenario is illustrative and is meant to represent one set of policies that could be used to reduce emissions in line with a 1.5°C scenario. Below, we show the policy assumptions in the 1.5°C scenario alongside approaches outlined in [Nevada's 2020 State Climate Strategy](#).

POLICY ASSUMPTIONS IN THE US 1.5 DEGREE SCENARIO

Sector	State Climate Strategy	US 1.5 Degree Scenario
Electricity	<ul style="list-style-type: none"> Transition from fossil-fueled electricity generation to clean energy sources Require greenhouse gas (GHG) reduction plans and prioritize decarbonization in utility integrated resource plans (IRPs) Prioritize energy efficiency and demand response programs 	<ul style="list-style-type: none"> Clean Electricity Standard of 80% by 2030, 100% by 2035 Accelerate deployment of storage, transmission, and demand response No new construction of coal and natural gas plants Accelerated fossil power plant retirements
Buildings (Residential & Commercial)	<ul style="list-style-type: none"> Adopt appliance and equipment efficiency standards Implement a statewide benchmarking program Require residential energy labeling and energy audits Adopt energy codes for net-zero buildings Expand the property-assessed clean energy (PACE) program Expand energy savings performance contracting (ESPC) Transition from residential and commercial use of gas 	<ul style="list-style-type: none"> 100% electric new appliances and buildings by 2030 ("building component electrification") 15% of existing buildings are retrofit by 2050 Enhanced building efficiency
Transportation	<ul style="list-style-type: none"> Adopt low- and zero-emissions vehicle standards Implement clean truck program Adopt low-carbon fuel standards Implement state car allowance rebate system ("cash for clunkers") Close emissions inspection loopholes for classic cars license plates <i>Transportation demand management and urban planning⁴</i> 	<ul style="list-style-type: none"> 100% electric new light-duty vehicle, motorbike, and bus sales by 2035 100% electric new medium- and heavy-duty truck sales by 2045 20% light-duty vehicle miles traveled reduced or shifted from BAU by 2050
Industry	<ul style="list-style-type: none"> Replace, capture, and recycle ozone-depleting substance substitutes 	<ul style="list-style-type: none"> 100% achievement of cement clinker substitution by 2050 100% achievement of HFC emissions reductions, consistent with the Kigali Amendment to the Montreal Protocol 17% improvement in industrial energy intensity/efficiency by 2050

⁴ This is not included on the short list of transportation sector policies, but is included as a category in the discussion of "Complex Climate Challenges" for Nevada.

		<ul style="list-style-type: none"> • 20% by 2030, 100% by 2050 shift from fossil fuels to a mix of electricity and hydrogen, varying by industrial potential for each fuel type, by 2050 • 5% reduction in cement demand and 10% reduction in iron and steel demand from improved material efficiency policies by 2050 • 100% achievement of potential emissions reductions from methane capture and destruction in natural gas and oil, coal mining, water, and waste sectors • 100% of hydrogen is produced via electrolysis by 2030 • 50% remaining industrial CO2 emissions captured and sequestered through CCS by 2050
Land use & Agriculture	<ul style="list-style-type: none"> • Expand urban forestry programs 	<ul style="list-style-type: none"> • 100% achievement of potential additional carbon uptake from afforestation/reforestation measures, improved forest management, cropland measures • 100% achievement of livestock methane measures (such as requiring anaerobic digesters) by 2050

Accelerated Efficiency, Electrification, & Renewables Scenario

An additional scenario has been included to illustrate an example of a rapid emission reduction scenario in the EPS. This scenario is intended to be a simple combination of EPS policy settings exemplifying some of the decarbonization approaches found to be ready to scale, cost-effective, and critical to near-term action in most recent literature: efficiency at the device and whole systems scale, electrification of buildings and on-road vehicles, and buildout of wind and solar power. It is similar to the [UNEP Emissions Gap Report 2019](https://www.unenvironment.org/resources/emissions-gap-report-2019)⁵ benchmark policies for the US to undertake “ambitious climate actions and targets.”

There is overlap with the US 1.5 Degree Scenario in some of these settings, though these settings may have more ambitious implementation schedules in this scenario. This scenario is designed as a generic US state scenario, and it has not been optimized to be most cost-effective or politically effective for Nevada.

POLICY ASSUMPTIONS IN THE ACCELERATED EFFICIENCY, ELECTRIFICATION, & RENEWABLES SCENARIO

Sector	Accelerated Efficiency, Electrification, & Renewables Scenario
Electricity	<ul style="list-style-type: none"> • 90% clean electricity standard by 2030 and 100% by 2040 • Accelerate deployment of storage, transmission, and demand response • \$100/ton carbon tax applied to electricity by 2030
Buildings	<ul style="list-style-type: none"> • 100% electric new appliances and buildings by 2030 (“building component electrification”) • 50% of existing buildings are retrofit by 2040
On-Road Transportation	<ul style="list-style-type: none"> • 100% electric new light-duty vehicle and bus sales by 2030 • 70% electric new truck sales by 2040 • 30% hydrogen new truck sales by 2040 • 26% light-duty vehicle miles traveled reduction from BAU by 2040

⁵ <https://www.unenvironment.org/resources/emissions-gap-report-2019>

Industry	<ul style="list-style-type: none"> • \$100/ton carbon tax applied to industry, including process (non-combustion) emissions, by 2030 • 100% of hydrogen is produced via electrolysis by 2030
Land use/Agriculture	<ul style="list-style-type: none"> • \$100/ton carbon tax applies to non-combustion emissions by 2030

Calculating Policy Impacts

Calculating Impacts of Policies (Emissions, Jobs, Health Impacts)

For additional information on Energy Innovation's Energy Policy Simulator, please view the tutorial [here](#).

About the EPS

The Energy Policy Simulator is a non-partisan, open-source, and peer-reviewed model. The EPS was developed to evaluate the impacts of climate and energy policies on emissions, costs and savings, and fuel consumption. The EPS model is used by policymakers to select and refine climate legislation. For example, the EPS model was used to assess the impact of climate policies for the U.S. House Select Committee on the Climate Crisis.⁶ EPS users input climate policies and the model then analyzes interacting policy impacts to forecast environmental and economic outcomes. The model generates a variety of data outputs including greenhouse gas emissions, criteria pollutant emissions, capital and operating cash flow changes, and macroeconomic changes to GDP and jobs. RMI and Energy Innovation are currently developing EPS models for 20 U.S. states.

The EPS model is available for download online [here](#).⁷ And full documentation on methodology and assumptions are available online [here](#).⁸

Contact

If you have questions about using the EPS, we recommend first watching our video series, available [here](#).⁹ For further information on the EPS, contact us at policy@energyinnovation.org. For more information on RMI analysis and our state advocacy support network contact us at [BeyondCarbon](#) Support@rmi.org.

The Nevada EPS is developed as a partnership between Energy Innovation and Rocky Mountain Institute (RMI), with RMI work supported by Bloomberg Philanthropies.

⁶ <https://energyinnovation.org/2020/07/28/hal-harveys-insights-and-updates-congressional-climate-plan-is-a-bet-your-country-moment/>

⁷ <https://us.energypolicy.solutions/docs/download.html>

⁸ <https://us.energypolicy.solutions/docs/index.html>

⁹ <https://us.energypolicy.solutions/docs/video-series.html>