

**THE ADVERSE EFFECTS OF COAL POWER PLANTS ON
WATER RESOURCES**

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Water is vital to the continued growth and vitality of Nevada. In the desert landscape of Southern Nevada, water is both vital and scarce. Las Vegas is the second-driest city in the nation, receiving just 4 inches of precipitation each year. The city relies on the Colorado River for 90 percent of its water, with 10 percent coming from groundwater sources. In this context, it is imperative that Nevada carefully manage its water resources.

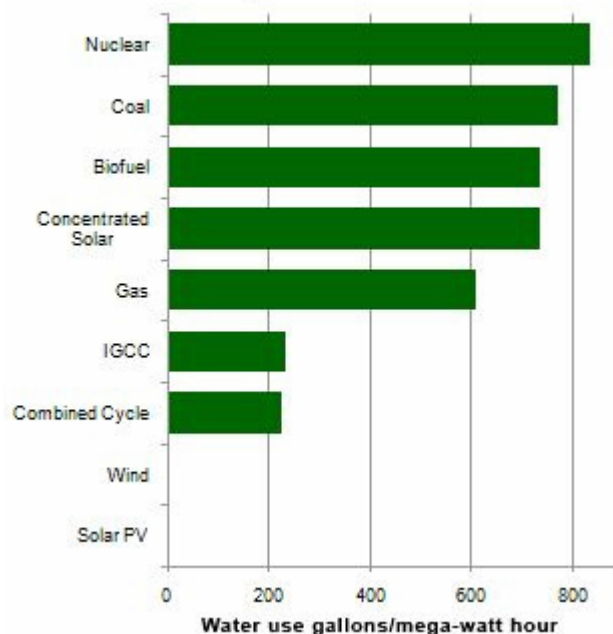
Coal power plants throughout the West hurt our ability to ensure access to water in three ways. First, they consume huge amounts of water, more than 650 million gallons per day throughout the Interior West. Second, coal plants discharge water that is often highly toxic, containing high levels of arsenic, lead and other chemicals. Third, coal power plants are a major contributor to global warming, producing enormous amounts of CO₂ emissions. Climate change is likely to either further reduce precipitation throughout the West while increasing aridity or it will change the cycle of precipitation, resulted in more rainfall and less snowfall and limiting our ability to ensure water availability throughout the year. New coal plants would strain our already limited water resources, pollute this valuable resource and accelerate climate change, further reducing the West's access to water.

Water Use

Coal plants in Nevada and throughout the Interior West use huge amounts of water. As the demand for water throughout the West increases, we will be forced to turn to energy alternatives that do not rely as heavily on water. New power plants will simply further strain our limited water resources and make it more difficult to reduce our reliance on water-guzzling coal plants.

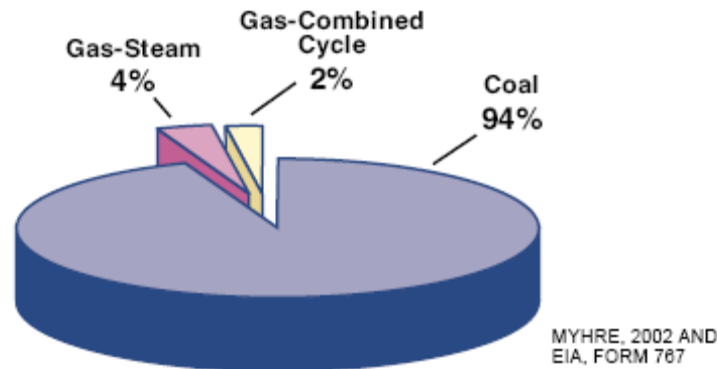
Coal Plants Use Far More Water Per Kilowatt Hour of Electricity Produced than All Other Sources of Generation Except Nuclear. According to an article in *Greenwire*, coal power plants use nearly 800 gallons of water per mega-watt hour of electricity produced. This is more than all other sources except nuclear power. [*Greenwire*, 10/4/07]

Water Use By Source Generation



Overwhelming Amount of Water Used in Power Generation in the Interior West Was Used by Coal Plants. Within the 8 state Interior West, coal plants use 335 of the 355 million gallons of water consumed each day by fossil-fuel plants in 2000. [Clean Air Task Force and The Land and Water Fund of the Rockies, "The Last Straw: Water Use by Power Plants in the Arid West, [April 2003](#)]

Figure 4 –
Daily freshwater consumption by fossil
plants in region in 2000

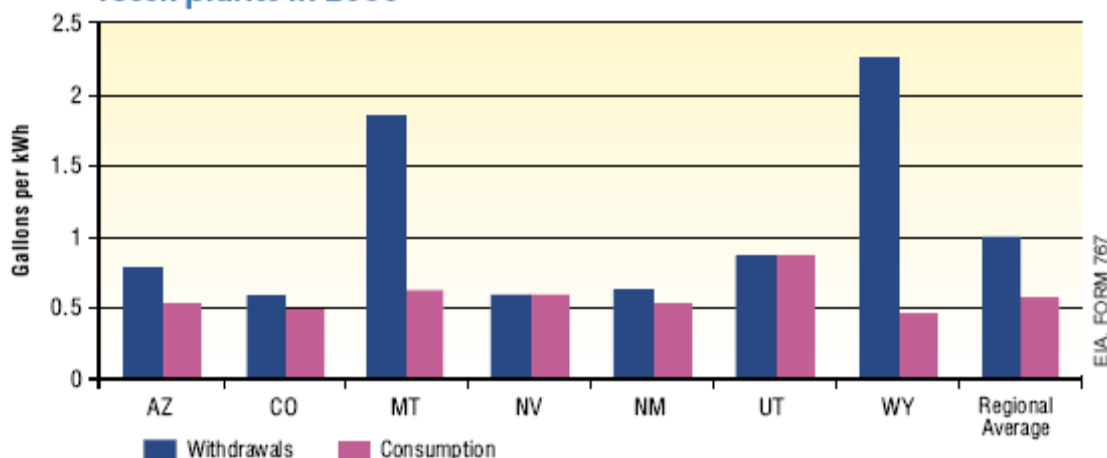


Power Plants in 8 Western States Withdraw Over 650 Million Gallons of Water Per Day – Enough to Provide Water for 4 Million People Per Year. “Coal and gas steam-generating electric plants in the eight-state Interior West currently withdraw over 650 million gallons every day. This is a lot of water. Over the course of a year, this same volume meets the municipal demands of almost four million people, the equivalent of six or seven cities the size of Albuquerque, Denver or Tucson.” [Clean Air Task Force and The Land and Water Fund of the Rockies, “The Last Straw: Water Use by Power Plants in the Arid West, [April 2003](#)]

- **Power Plants in Nevada Withdrew 14 Billion Gallons of Water in 2000.** In Nevada alone, power plants withdrew 14 billion gallons of water in 2000. [Clean Air Task Force and The Land and Water Fund of the Rockies, “The Last Straw: Water Use by Power Plants in the Arid West, [April 2003](#)]

Nevada Power Plants Averaged 0.6 Gallons of Water Withdrawn and Consumed Per Kilowatt Hour Produced in 2000. According to a report by Clean Air Task Force and The Land and Water Fund of the Rockies, power plants in Nevada average 0.6 gallons of water withdrawn and consumed per Kilowatt Hour in 2000. [Clean Air Task Force and The Land and Water Fund of the Rockies, “The Last Straw: Water Use by Power Plants in the Arid West, [April 2003](#)]

**Figure 2 –
Regional water withdrawals and consumption at
fossil plants in 2000**



Coal-to-Liquids Plants Would Require Huge Amounts of Water. “Gov. Jim Gibbons announced a major energy initiative in his State of the State speech Monday, calling for the construction of a coal-to-liquids fuel plant in Nevada that would use rail lines to import coal, which would then be converted to diesel and jet fuel. The proposal left many legislators and policy experts scratching their heads Tuesday. Nevada has an abundance of wind and solar energy sources but no coal, and the process consumes huge amounts of water, which is in short supply in Nevada.” [*Las Vegas Sun*, [1/24/07](#)]

- **It Takes 5 Gallons of Water to Produce 1 Gallon of Liquid Fuel** “As for the coal-energy plant, the Montana Environmental Information Center, a group that lobbies for environmental issues, has reported that 5 gallons of water are required to produce a gallon of liquid fuel. But it was the lack of coal in Nevada that puzzled legislators.” [*Las Vegas Sun*, [1/24/07](#)]

Just Two of Proposed Nevada Coal Plants Would Use 3.4 Billion Gallons of Water Per Year. According to a report by Western Resource Advocates and Environmental Defense, just two of the proposed coal plants in Nevada would use a combined 3.4 billion gallons of water per year. The proposed Sierra Pacific Resources plant near Ely, Nevada would use 2.6 billion gallons of water per year. The proposed Sithe Global near Mesquite, Nevada would use about 800 million gallons of water per year. [Western Resource Advocates and Environmental Defense, “Climate Alert: Cleaner Energy for the Southwest,” [2007](#)]

Power Production Reliant on Water Can Be Adversely Affected By Drought.

“Drought conditions result in water scarcity and intensified competition for finite water supplies. Drought can significantly reduce electric power generation based on site-specific engineering and hydrologic conditions, can constrain or curtail power production at fossil power plants for reasons related to cooling system design and operation, can cause cooling water source levels to fall below intake structures and can result in water temperatures that prevent acceptable levels in cooling system discharge waters.” [Clean Air

Task Force and The Land and Water Fund of the Rockies, “The Last Straw: Water Use by Power Plants in the Arid West, [April 2003](#)]

Coal Plants Strain Groundwater Resources

Coal plants contribute to the depletion of groundwater resources on a sites-pecific basis throughout the West. Las Vegas relies on local groundwater resources to provide 10 percent of its water.

Water Diversion and Consumption By Fossil Fuel Plants Can Have Significant Impacts on Streams and Groundwater Resources. “Water diversion and consumption by fossil fuel plants in the West, while small relative to agriculture, can still have significant impacts on streams and groundwater resources on a site-specific basis, especially in basins where water is already stretched to the limit.” [Clean Air Task Force and The Land and Water Fund of the Rockies, “The Last Straw: Water Use by Power Plants in the Arid West, [April 2003](#)]

Navajo and Hopi Have Raised Concerns About Groundwater Depletion Due to Mohave Plant. “For decades, the Mohave plant has been blamed for some of the pollution obscuring views in the Grand Canyon. Environmental groups sued under the Clean Air Act to force the plant to add modern pollution controls, and in 1999 Edison agreed to do the upgrades by Jan. 1, 2006, or shut the plant down...Many Navajo and Hopi tribal members raised concerns about groundwater depletion and a study has been under way to try to find a more plentiful source of water for the pipeline.” [Associated Press, 9/26/06]

Coal Power Plants Directly Pollute Water Resources

Coal power plants discharge water polluted by chemicals and impurities back into water sources, causing significant environmental damage. A patchwork of regulatory authority divided between federal, state and local jurisdictions contributes to poor enforcement of pollution laws. The result is all too often a major pollution violation, with serious consequences for vital water sources.

Coal Preparation Nationwide Produces 90 Million Gallons Per Year of Sludge Made Up of Water, Chemicals and Impurities. “Coal preparation uses large quantities of water and chemicals to separate impurities from mined coal, washing away the wastes in a sludge known as slurry. Up to 90 million gallons of slurry are produced every year in the U.S.” [[Sierra Club](#)]

Discharge Waters Often Contain High Concentrations of Copper, Arsenic, Cadmium, Chromium, Lead, Selenium, Sulfates and Boron. “A common chemical from discharge waters is copper, which can leach from water condenser piping and end up in discharge waters, sometimes at toxic levels. In addition, waters discharged from waste treatment have been shown to have high concentrations of arsenic, cadmium, chromium, lead, selenium, sulfates and boron.” [Clean Air Task Force and The Land and Water Fund of the Rockies, “The Last Straw: Water Use by Power Plants in the Arid West, [April 2003](#)]

Chlorine and Biocides Are Discharged by Coal Plants Under Standards that Vary By State. “Chlorine and its by-products are present in the discharge water plume and can be toxic to aquatic life, even at low concentrations. High water temperatures can magnify the damaging impacts of chlorine. Chlorine and biocide discharges are subject to federal and state water quality standards. Pursuant to EPA regulation, plants must use best practicable control technology and avoid discharge in toxic amounts. EPA, however, lacks a list of EPA-approved biocides and delegates most regulation to states. At the state level, implementation of standards varies.” [Clean Air Task Force and The Land and Water Fund of the Rockies, “The Last Straw: Water Use by Power Plants in the Arid West, [April 2003](#)]

Coal Plants Emit Mercury, Which Falls to Earth in Rain and Pollutes Water Sources, Poisoning Fish and Humans. “When coal is burned at power plants, it releases mercury into our atmosphere. This mercury falls to earth in rain, running into our lakes, rivers and streams. Bacteria in the water transform this mercury into toxic methyl-mercury. When fish consume this bacteria, they become contaminated. Fish that eat other contaminated fish end up with even higher levels of toxic mercury in their flesh. Humans can be contaminated with this methyl-mercury by eating contaminated fish.” [[Sierra Club](#)]

Regulation of Water Quality Is Plagued By Understaffing and Division of Responsibility Across Federal, State and Local Authorities. “Across the West, state and federal agencies responsible for water quality are understaffed and often have difficulty reaching decisions that adequately protect water systems. Clear guidance is needed through federal and state regulation to address power plant water use. Decisions about water withdrawals and plant siting permits are handled differently by different

states and fall within the jurisdiction of local, regional and state planning and regulatory agencies. Power plant water discharges are regulated largely at the state level, whereas rules for water allocation and use are grounded on state and local law. [Clean Air Task Force and The Land and Water Fund of the Rockies, “The Last Straw: Water Use by Power Plants in the Arid West, [April 2003](#)]

EPA Found Over 10 Percent of Clean Water Act Violations Were “Significant Non-Compliance.” “In an analysis conducted on violations, compliance and enforcement of air, water and solid waste laws in the power plant sector, US EPA found that over 10 percent of the CWA violations were considered to be of “significant non-compliance.” [Clean Air Task Force and The Land and Water Fund of the Rockies, “The Last Straw: Water Use by Power Plants in the Arid West, [April 2003](#)]

Coal Plants Contribute to Global Warming

Coal power plants are the source of more carbon dioxide pollution than any other source, making them a leading cause of global warming. Scientists believe that global warming will dramatically reduce the availability of water in the Western United States, including Nevada. Therefore, increasing our reliance on coal power plants will further contribute to future water shortages.

Coal Is Single-Greatest Contributor of Carbon Dioxide Pollution, Surpassing Cars.

“Coal-burning power plants are the largest U.S. source of carbon dioxide pollution – they produce 2.5 billion tons every year. Automobiles, the second largest source, create nearly 1.5 billion tons of CO₂ annually.” [National Resources Defense Council Issue Sheet, [2/9/07](#)]

Worldwide Study Found Growth in Coal Power Has Increased Rates of Carbon Emissions.

“Fueled by rapid growth in coal-reliant China, rates of carbon dioxide emission from industrial sources increased from 2000 to 2004 ‘at a rate that is over three times the rate during the 1990s,’ says a report released by the journal *Proceedings of the National Academy of Sciences*. Carbon dioxide, released when coal, oil and natural gas burn, is a major ‘greenhouse gas,’ so named because it absorbs the sun’s heat in the atmosphere.” [USA Today, [5/21/07](#)]

- **Coal Is Much Dirtier Than Other Fossil Fuels.** “‘This should serve as a notice to the global community that renewed and stronger efforts are necessary in this political, economic and scientific milieu,’ says Robert Andres of the Carbon Dioxide Information Analysis Center at Oak Ridge (Tenn.) National Laboratory, who was not part of the study. The results show that the world is burning more coal than ever. ‘Coal is abundant and cheap but much dirtier than other fossil fuels,’ Field says.” [USA Today, [5/21/07](#)]

Intergovernmental Panel on Climate Change Predicted 7.2 Degree Surface Temperature Increase by 2100 If World Continues Its Reliance on Fossil Fuels.

“In February, the Intergovernmental Panel on Climate Change predicted a 7.2-degree rise in surface temperatures by 2100 if the world pursues growth reliant on fossil fuels, producing more severe droughts, floods and heat waves. The study’s real-world carbon dioxide emissions rate exceeds the panel’s assumptions. Carbon dioxide is responsible for about half of the 1-degree increase in average surface temperatures attributable to human activities in the past century, the climate change panel says.” [USA Today, [5/21/07](#)]

Southwest Coal Plants Among the Dirtiest in the U.S. – Already Emit 176 Million Tons of Pollution Each Year.

“The region already is home to some of the nation’s largest and dirtiest coal plants. Combined, they emit 176 million tons of global warming pollution each year, and if the proposed plants are built, they will boost that annual output by 40 percent – and continue operating for decades.” [Western Resource Advocates News Release, [1/30/07](#)]

FIGURE 1
Existing and proposed coal-fired power plants in the southwestern United States



*This is a possible location. The actual location has not yet been announced.

Carbon Dioxide Emissions from Three Proposed Nevada Coal Plants Would Exceed 24 Million Tons Per Year. According to a report by Western Resource Advocates and Environmental Defense, the three proposed coal plants in Nevada would produce a combined 24.4 million tons of carbon dioxide emissions per year. The proposed Sierra Pacific Resources plant near Ely, Nevada would produce 12.6 million tons of carbon dioxide emissions per year, more than any of the other proposed coal plants in the Southwest. The proposed Sithe Global plant near Mesquite, Nevada would produce 6.3 million tons of carbon dioxide emissions per year. The proposed White Pine Energy Associates plant near White Pine, Nevada would produce 5.5 million tons of carbon dioxide emissions per year. [Western Resource Advocates and Environmental Defense, “Climate Alert: Cleaner Energy for the Southwest,” 2007]

California Prohibits Investor-Owned Utilities from Entering Long-Term Contracts for Power from Coal Plants Because of CO2 Emissions. “Unlike Nevada, where three coal-fired power plants are planned, California prohibits investor-owned utilities from entering long-term contracts for power from coal plants because of the massive quantities of carbon dioxide coal plants emit. California intends to rely mostly on natural gas-fired plants for the power it cannot obtain from renewable energy sources, O’Donnell said.” [Las Vegas Review-Journal, 10/3/07]

Nevada Appeal: Nevada Coal Plant Permits Doled Out Too Fast for Evaluation of Pollution. “The state would be wise to invest its political energy in realizing the potential of those reserves, rather than building three coal plants that will spew pollutants into the state’s clean air. The permitting for the plants has been happening so quickly that

the state doesn't even have a good plan for regulating those pollutants.” [Nevada Appeal, Editorial, [10/9/07](#)]

Intergovernmental Panel on Climate Change Found Global Warming Will Make Southwest Much Hotter and Drier, With Extensive Drought. “Global warming will permanently change the climate of the American Southwest, making it so much hotter and drier that Dust Bowl-scale droughts will become common, a new climate report concludes... The prediction of a drier Southwest was made by 16 of 19 climate computer models assembled for the Intergovernmental Panel on Climate Change, the international scientific effort to assess the impact of global warming, which is releasing a new report today. The drought results were analyzed separately in a paper published online yesterday by the journal Science, which also predicted that regions outside the drying belt will get more rain... He said that the paper's authors have a high level of confidence that droughts will develop, and that they will result from increases in atmospheric greenhouse gases created through burning fossil fuels and other human activities.” [Washington Post, [4/6/07](#)]

Climate Change Is Reducing Snowpack In the West, Resulting in Decreased Water Supplies. “By comparison, the steady decrease in mountain snowpack — the loss of the deep accumulation of high-altitude winter snow that melts each spring to provide the American West with most of its water — seems to be a more modest worry. But not all researchers agree with this ranking of dangers. Last May, for instance, Steven Chu, a Nobel laureate and the director of the Lawrence Berkeley National Laboratory, one of the United States government's pre-eminent research facilities, remarked that diminished supplies of fresh water might prove a far more serious problem than slowly rising seas. When I met with Chu last summer in Berkeley, the snowpack in the Sierra Nevada, which provides most of the water for Northern California, was at its lowest level in 20 years. Chu noted that even the most optimistic climate models for the second half of this century suggest that 30 to 70 percent of the snowpack will disappear. ‘There's a two-thirds chance there will be a disaster,’ Chu said, ‘and that's in the best scenario.’” [New York Times, [7/21/07](#)]

- **Scientists Fear Shorter Winters Are Already Depleting Snowpack, Which Provides Water for Two-Thirds of the Population of the American West.** “(C)limate researchers say global warming already has shortened winter in much of the West by two weeks or more. Global warming ‘isn't something that's going to emerge in 2050,’ says Philip Mote, Washington's state climatologist. ‘It's already happening.’ The water supply for more than two-thirds of the West's population comes from melting of winter snow, stored high in the mountains like freezers full of shaved ice. In spring, that snowpack begins to thaw. The snowmelt flows into streams and reservoirs, which store and deliver water for drinking, crop irrigation, hydropower and other uses during typically drier summer, fall and winter months. ‘Snow is the cornerstone of water in the West,’ says Mote, a member of the Joint Institute for the Study of the Atmosphere and Ocean, a research collaboration between universities and the federal government.” [USA Today, [5/30/06](#)]

- **Department of Energy Forecasts Western Mountains Losing Nearly Half Their Snowpack.** “A new climate model developed by the Energy Department's Pacific Northwest National Laboratory projected this month that many of Earth's high mountain ranges could lose much of their seasonal snow cover by the end of the century. It forecasts the Sierra Nevada, Cascades and southern Rockies to lose 43% of winter snowpack.” [USA Today, [5/30/06](#)]
- **Climate Change May Alter Reliability of Snowmelt, Which Provides Drinking Water for One-Sixth of the World's Population.** “Snowmelt provides drinking water to one-sixth of the world's population and provides important agricultural and recreational resources for the Western United States, said Painter. The progression of climate change may alter the reliability of spring snowmelt, including its quantity, timing and duration, he said.” [*Space Daily*, 6/26/07]

Global Warming Could Have Dramatic Consequences for Availability of Water in Southwest. “But hundreds of miles from the sea, the deserts and mountain ranges of the American Southwest are precariously vulnerable to climate change. Unless we take aggressive action, scientists expect global warming to have profound consequences across the Southwest in this century. Changes to the amount and timing of precipitation and snowmelt could dramatically alter the availability of already scarce water resources and increase seasonal flooding. Droughts could also become more frequent and extreme. The vibrant agricultural industry could suffer, drinking water could become harder to obtain, and fragile desert and mountain ecosystems could disappear.” [Western Resource Advocates and Environmental Defense, “Climate Alert: Cleaner Energy for the Southwest,” [2007](#)]

- **Higher Temperatures Could Cause Increased Rain, Hurting the West's Ability to Store Precipitation and Adversely Affect Water Supplies.** “If higher temperatures cause increased precipitation, they will also likely lead to more precipitation falling as rain rather than snow, and to earlier snowmelt. These developments could severely limit the region's ability to store and use the precipitation that falls. If a change in the snow/rain ratio is combined with earlier melting and reduced precipitation, the effect on water supplies could be considerably worse.” [Western Resource Advocates and Environmental Defense, “Climate Alert: Cleaner Energy for the Southwest,” [2007](#)]
- **Global Warming Could Cause Higher Temperatures Without Additional Precipitation in the West Would Reduce Water Availability.** “Other climate models predict higher temperatures without additional precipitation in many parts of the West. This scenario would contribute to the decline of both agriculture and ranching, because of increased aridity and reduced water availability.” [Western Resource Advocates and Environmental Defense, “Climate Alert: Cleaner Energy for the Southwest,” [2007](#)]

Climate Change Could Threaten Water Levels in the Colorado River, Which is Source of 90 Percent of Southern Nevada's Water. According to a study by Western Resource Advocates and Environmental Defense, “Climate change could also threaten water levels in the Colorado River, which is the major source of fresh water for much of

the Southwest.” According to the Southern Nevada Water Authority, “Southern Nevada gets nearly 90 percent of its water from the Colorado River.” [Western Resource Advocates and Environmental Defense, “Climate Alert: Cleaner Energy for the Southwest,” 2007; Southern Nevada Water Authority, www.snwa.com]