Western Resource Advocates

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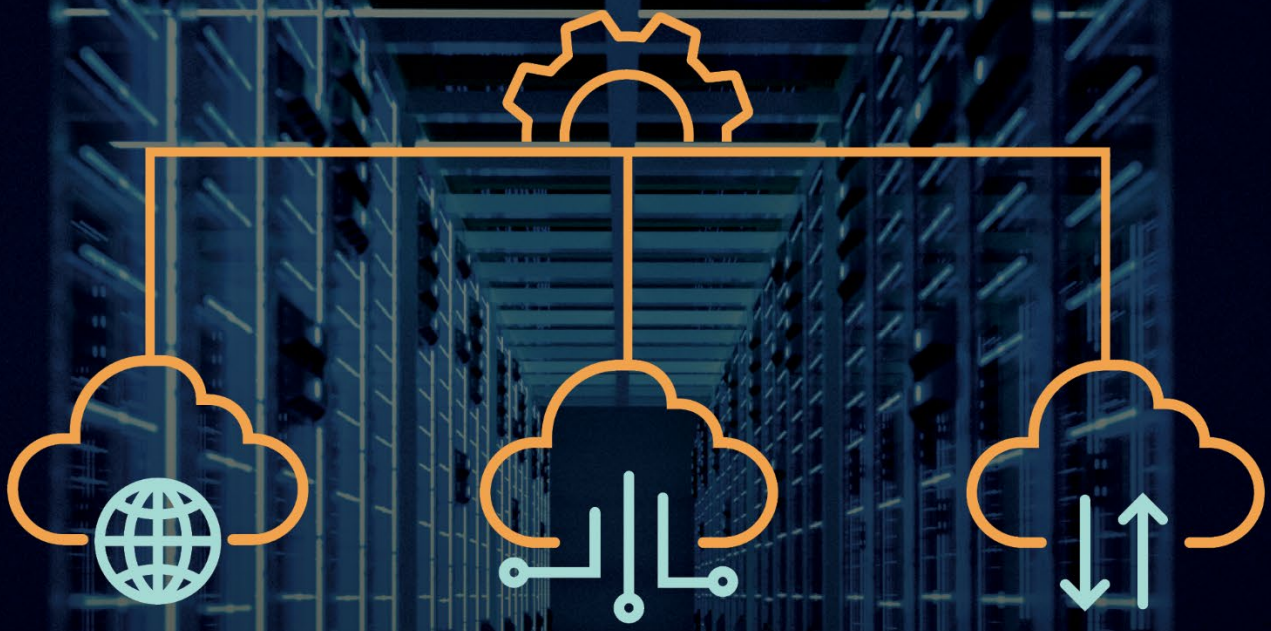

## EXECUTIVE SUMMARY

# DATA CENTER IMPACTS IN THE WEST

## Policy Solutions for Water and Energy Use


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*A data center in Leesburg, Virginia.*

# Executive Summary

Data centers pose a myriad of challenges for policymakers. Significantly expanded demands for electricity threaten electric utilities' ability to reduce the greenhouse gas pollution that causes climate change; water demands for cooling may strain scarce water supplies; and new costs and economic risks may be imposed on other electric customers.

Projected electricity demand — or load growth — associated with data centers has appeared virtually overnight primarily due to the recent proliferation of artificial intelligence. All of these factors present a challenge for meeting clean energy and water conservation goals. In this report, Western Resource Advocates (WRA) describes the problem and suggests policies for mitigating these impacts and harnessing data centers as a tool for clean energy development.

Over just the past few years, seven of the eight largest utilities in the Interior West, located in Arizona, Colorado, Nevada, New Mexico, and Utah — where WRA works to decarbonize the power sector — have seen collective load forecasts increased significantly, largely due to the projected electricity demands of data centers. From 2010 through 2023, total annual electricity sales grew by approximately 1% per year.[1] Now, **the utilities are collectively forecasting an increase in annual energy demand of about 4.5% per year between 2025 and 2035. A similar trend is true for peak**

[1] Calculated from US Energy Information Administration, "EIA-861 Annual Electric Power Industry Report," October 2024. **https://www.eia.gov/electricity/data/state/**

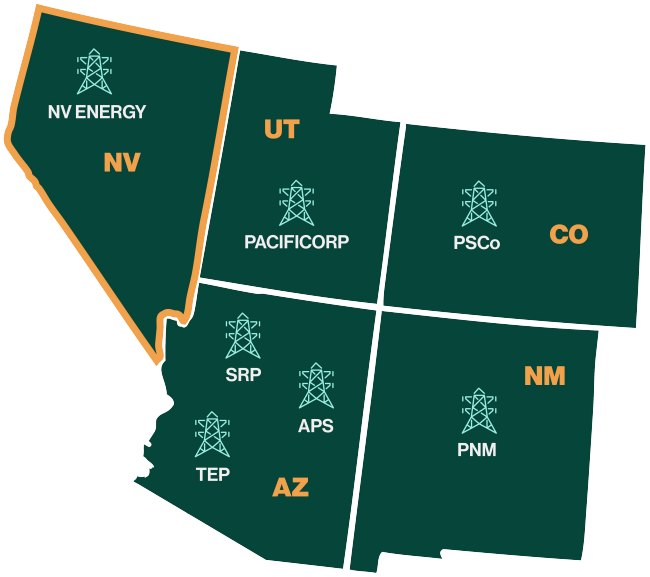
**energy demands, exacerbating grid stress.** These higher load forecasts are driving increased greenhouse gas emissions for utilities. One telling example is NV Energy, whose projected emissions in its 2024 Integrated Resource Plan (IRP) jumped 53% from its 2022 estimates.[2] This amounts to 3.2 million tons of additional greenhouse gas pollution.[3]

**53% increase in greenhouse gas emissions**

from 2022 IRP estimates.

**3.2M additional tons**

of greenhouse gas pollution.



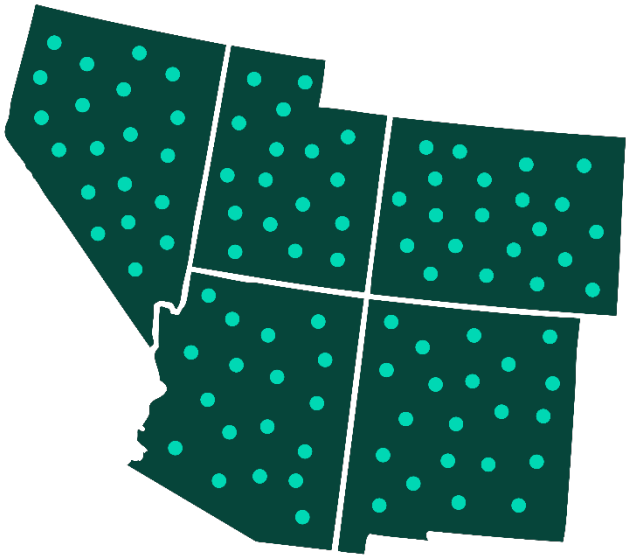

In addition to the energy demands, many data centers use large volumes of water to cool and protect the computer hardware they contain. If utility predictions on data center growth come to fruition, data centers in the five states noted above could have annual, on-site consumptive water use of 13,700 acre-feet (4.5 billion gallons) in 2030, and 21,600 acre-feet (7 billion gallons) in 2035, assuming they use conventional water-based cooling technologies.[4] For comparison, 21,600 acre-feet is enough

[2] Based on a comparison of NV Energy's projected fuel mixes and $CO_2$ emissions from the preferred Repower Minimum case in Public Utilities Commission of Nevada Docket No. 23-08015 and preferred Balanced case in Public Utilities Commission of Nevada Docket No. 24-05041. For 2030, the Balanced case projects 2030 $CO^2$ emissions at 8.41 million metric tons, versus 5.48 million metric tons projected for the same year under the prior Repower Minimum case - an increase of 2.93 million metric tons, or 3.2 million short tons. A comparison of the 2030 fuel mix projections from the two dockets shows similar amounts of renewable generation (21,752 GWh for Repower Minimum versus 21,676 GWh for Balanced), but a big increase in the amount of natural gas generation (10,455 GWh Repower Minimum versus 17,642 GWh Balanced) under the new load forecast.

[3] Estimated change in emissions between the 2024 IRP Balanced Plan (Public Utilities Commission of Nevada Docket No. 24-05041), and the Fifth Amendment to the 2021 IRP (Public Utilities Commission of Nevada Docket No. 23-08015).

[4] Using an estimate of the national average onsite water intensity of data centers of 0.36 L/kWh (equal to 95 gallons/MWh) and the electric utilities' energy demand projections, we estimate the incremental, additional water demands associated with cooling data centers in the five-state region could be 13,700 acre-feet per year in 2030 and 21,600 acre-feet per year in 2035.

water to support 194,000 people per year.[5] In the arid Interior West, where water supplies are already scarce, and becoming more so, this level of increased demand poses unique risks and challenges.



● Is equivalent to 2,000 people, representing 194,000 people in total.

**13.7K**
estimated acre-feet of consumptive water use by 2030.

**21.6K**
estimated acre-feet of consumptive water use by 2035.

While data centers pose an emerging threat, the adoption of smart policies can reduce the impacts. Major data center companies — Google, Meta, Amazon, and others — have expansive financial resources, and many have company climate and clean energy goals. If these sources of new electricity prioritize corporate responsibility and sustainability commitments, they could help accelerate the clean energy transition and minimize use of scarce water resources. To address the emerging challenges and drive positive outcomes, WRA recommends that utilities, regulators, and elected leaders evaluate and adopt policies that advance clean energy, protect electricity customers, and minimize and mitigate impacts on water resources.

WRA's potential policies are summarized in this Executive Summary and explored in depth in the report.

[5] Water Education Foundation, "Acre-Foot." **https://www.watereducation.org/aquapedia/acre-foot**

*Wind turbines and battery storage at a power plant in Palm Springs, California.*

## Advancing Clean Energy: Create Clean Transition Tariffs

Clean transition tariffs can enable new data center customers to develop and finance clean energy resources like solar with battery storage and wind. Under a clean transition tariff, a utility may develop new, clean resources on behalf of its data center customers, and the data center pays any incremental additional cost of the clean resource, without impacting other utility customers. Regulators must determine which resources are eligible under a clean transition tariff and ensure that other customers are paying their full share of the costs.

## Advancing Clean Energy: Deploy Behind-the-Meter Clean Resources

Allowing data centers to invest in behind-the-meter clean resources can help decarbonize the grid. With behind-the-meter resources, the data center develops, owns, and operates the clean energy resource directly. Data centers should be limited to deploying clean resources and not behind-the-meter gas or diesel generators, which emit harmful greenhouse gas pollution and degrade local air quality. A behind-the-meter program could also allow data centers to develop behind-the-meter energy storage systems.

## Advancing Clean Energy: Encourage Load Shifting

Data centers are generally high load factor customers — their demand for electricity is relatively constant from hour to hour and day to day. However, certain types of data centers may be able to participate in demand response programs, shifting their electricity consumption away from times of peak electricity demand, thereby reducing costs and strain on the broader grid. Utilities can encourage this behavior by crafting load interconnection standards or tariffs with provisions that allow for load interruption, in exchange for faster interconnection.

## Advancing Clean Energy: Require Energy Efficiency Best Practices

Decision makers should establish efficiency-related requirements for interconnecting new data centers, like employing energy efficiency best practices, and reducing the total energy consumption of data centers.

## Protecting Electricity Customers: Reform Resource Planning and Acquisitions

The explosion of projected data center electricity needs has injected massive uncertainty into utilities' near- and long-term load growth projections in a very short period of time, straining their ability to accurately forecast future system needs. If utilities overbuild transmission, generation, or distribution infrastructure, then residential and commercial customers could be left on the hook, forced to pay for capital investments that turn out to be unnecessary. To improve load forecasts, utility regulators should establish best practices and requirements for utility load forecasting. Regulators should also consider revamping their Integrated Resource Planning (IRP) processes to better accommodate the rapid and uncertain nature of data center growth.

## Protecting Electricity Customers: Establish Contract Provisions to Prevent Cross-Subsidies

Projections indicate that data centers are a vast source of new electricity load, potentially requiring significant utility investments in generation and transmission. If data center loads do not materialize, or do not remain on the system for as many years as forecasted, remaining customers are likely to bear the financial costs of capital investments that become stranded assets. It is critical that utilities develop robust contract provisions for data centers that will protect other customers from having to subsidize them. Such provisions could include minimum contract lengths and exit penalties for new large load customers, financial collateral requirements, and minimum demand payments to ensure data centers are contributing to the costs of the overall system.

*A person adjusts a smart thermostat.*

## Protecting Electricity Customers: Follow Best Practices in Ratemaking

The impact of sudden large concentrated new loads that require massive amounts of new energy and capacity investments poses a challenge to the status quo of ratemaking. The magnitude and characteristics of data center loads require updates and tailored considerations within the ratemaking process to ensure new large customers are paying their fair share through the regulatory process known as cost allocation. This could include creating a new rate class for these types of customers, given their unique attributes and system impacts. Issues such as generation and transmission capacity needs, power quality investments, contribution to peak capacity, and others need to be addressed specifically for data centers. The regulatory processes must adapt to protect customers.

## Protecting Electricity Customers: Restructure Economic Development Rates

Currently, data centers often receive incentives in the form of reduced electricity rates, sometimes referred to as economic development rates. Historically, these rates were designed to attract new large industrial or manufacturing facilities with high electricity demands that supported a sizeable new workforce and contributed significantly to the local tax base. WRA recommends that states and utilities structure new or reform existing economic development rates in a way that targets customers whose loads support significant, permanent employment. WRA believes this will make many data centers ineligible for economic development rates. Economic development rates should be available to data centers only if the utility can demonstrate that the rates provide a clear benefit to other utility customers and do not shift costs between customer classes, and that the data center will be powered with clean, zero-carbon electricity.

## Protecting Water Resources: Water Efficiency and Reporting Requirements

Water use in data centers can vary significantly depending on the cooling system employed. In addition, there are clear trade-offs between energy use and water use. Water-cooled data centers generally use less energy, while data centers that employ water-efficient dry-cooling systems have higher energy demands. Given these trade-offs, the type of cooling system should be evaluated and selected on a case-by-case basis.

At a minimum, water used by data centers should not harm sensitive streams or habitat. If a data center's projected water demands would require tapping local surface or groundwater resources, and that water use could adversely impact valuable streams and habitats, it should be required to install water-efficient cooling systems such as dry-cooling or liquid-cooling technologies (other than water). Data centers in the Interior West region should also minimize their water demands through efficiency measures and water reuse. Local jurisdictions can require data centers to offset their water use by investing in local conservation programs.

Finally, the lack of comprehensive information on cooling systems and water use by data centers today presents a critical informational gap. Decision makers should address this by instituting reporting requirements.

*A stream flows in the San Juan Mountains.*

**Access WRA's Full Report**

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