New Data Center Water and Electricity Demand in Nevada

SN-ICC Presentation

Erik M. Henzl

October 2026

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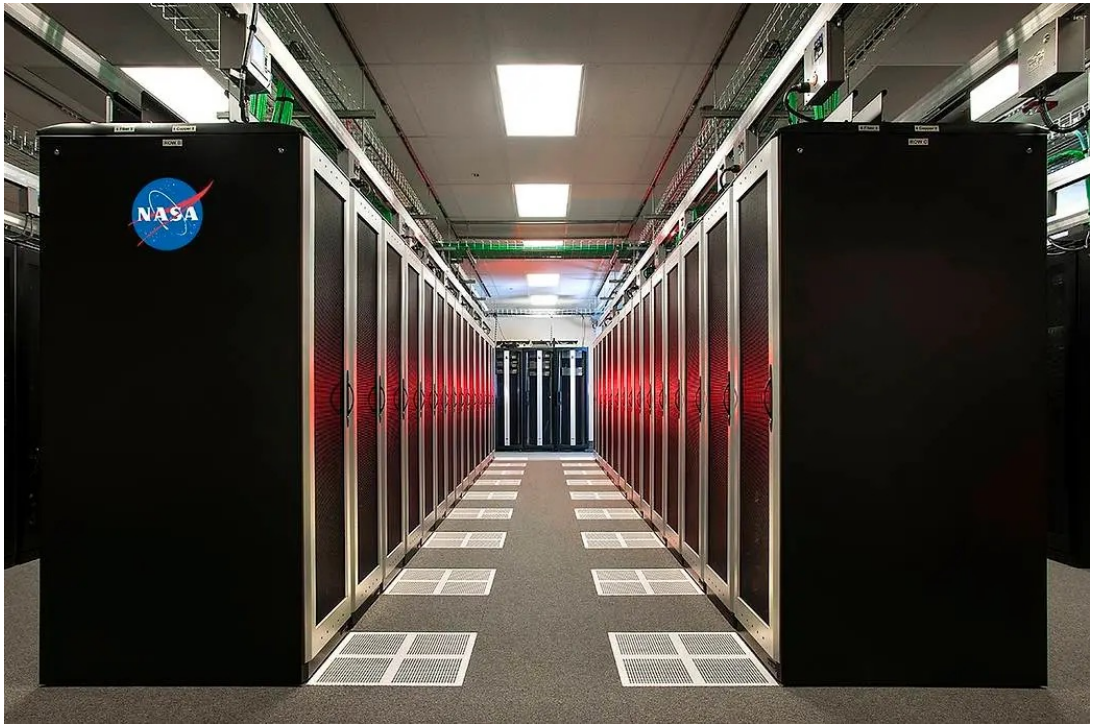
Overview

1. NV is one of the fastest-growing data center markets in the U.S.
2. Indirect water demand exceeds direct water demand
3. Several opportunities to offset demand and/or boost efficiency
4. NV Energy's 2026 IRP signals steeper growth relative to 2024 outlook
5. Uncertainties remain
   - Need for more data
   - Community preparedness



NASA server cabinets in the Consolidated Information Technology Center (Tschida, 2013)

Different data center space types serve different purposes

Small (1-5 MW)

- Enterprise/edge facilities
- May serve individual businesses and institutions

Midsize/Colocation (5-20 MW)

- Provides for wholesale and retail colocation leasing
- Colocation facilities may be larger

Hyperscale (100+ MW)

- Large-scale workloads of cloud computing and AI

Interior of a data center (Latter, 2024).

Data centers have become more efficient over time, but demand has surged in recent years

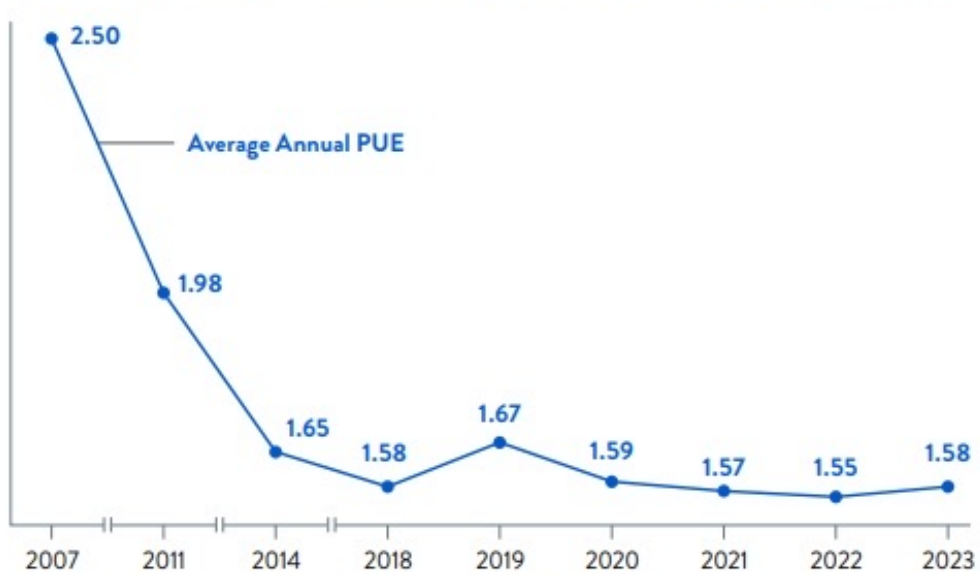


Figure 7. Average annual PUE in data centers, 2007–2023 [26, 29]

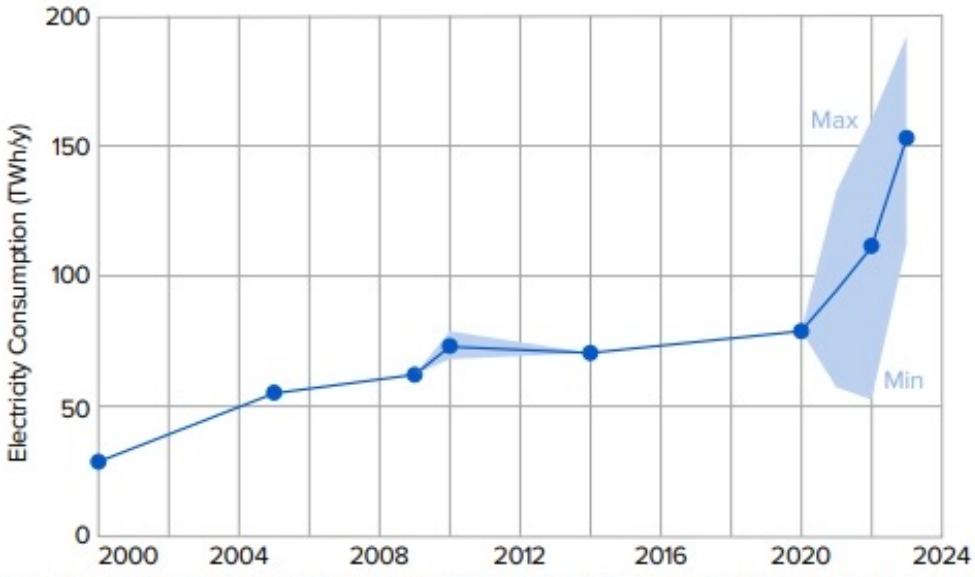


Figure 6. U.S. data center load growth from 2000 to 2023. The graph's light blue area indicates the uncertainty range based on two datasets estimating recent-to-current data center loads [4, 8, 9]

2000-2010: Increasing data center energy demands
2010-2020: Efficiency gains flatten energy demand even as data center usage increases
2020-Present: Demand surges due to the rise of cloud computing and AI
(Source: EPRI, 2024)

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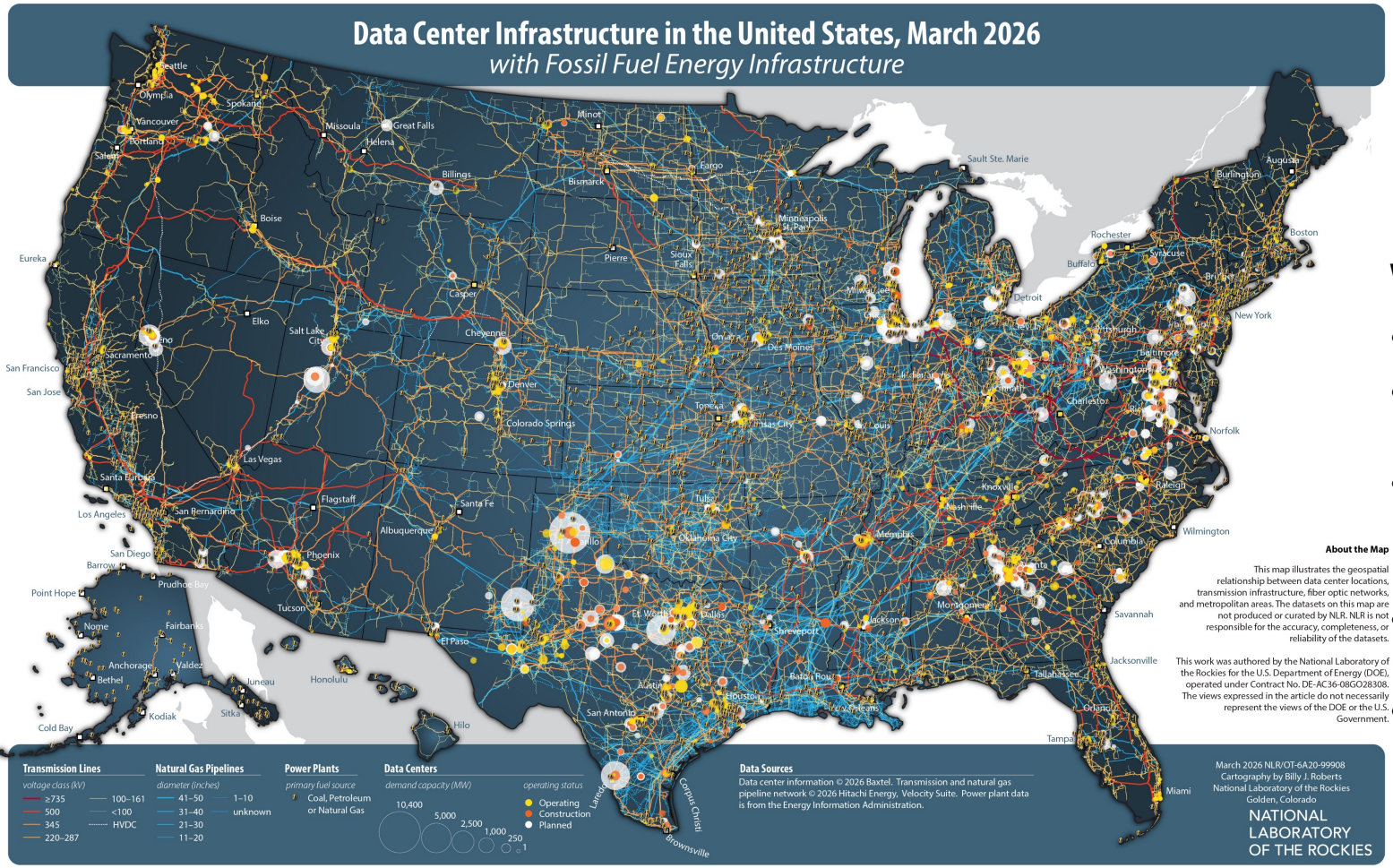


U.S. data center capacity and electrical infrastructure (Roberts, 2026)

Why Nevada?

- Abundant land
- Cost-competitive energy
- Business-friendly tax and regulatory environment
- Proximity to key markets
- Low natural disaster risk

Nevada has >1,000 MW of operational data center capacity and >8 GW either in construction or planned

Data center demand surges in Northern Nevada

All values in MW

Data Center Demand Capacity (MW) in Nevada Compared to Established Hubs						
	Washoe	**Storey**	**Lyon**	**Elko**	**Clark**	**Nevada Total**
Operating	101.98	431	0	0	555.47	1,088.45
Construction	12	5,187	0	0	120	5,319
Planned	36.5	1,092	1,700	2.7	287	3,118.2
Total	150.48	6,710	1,700	2.7	962.47	9,525.65

NV Energy's 2026 IRP outlines 16,530 MW of requested capacity by 2036 and load growth of 43,754 GWh

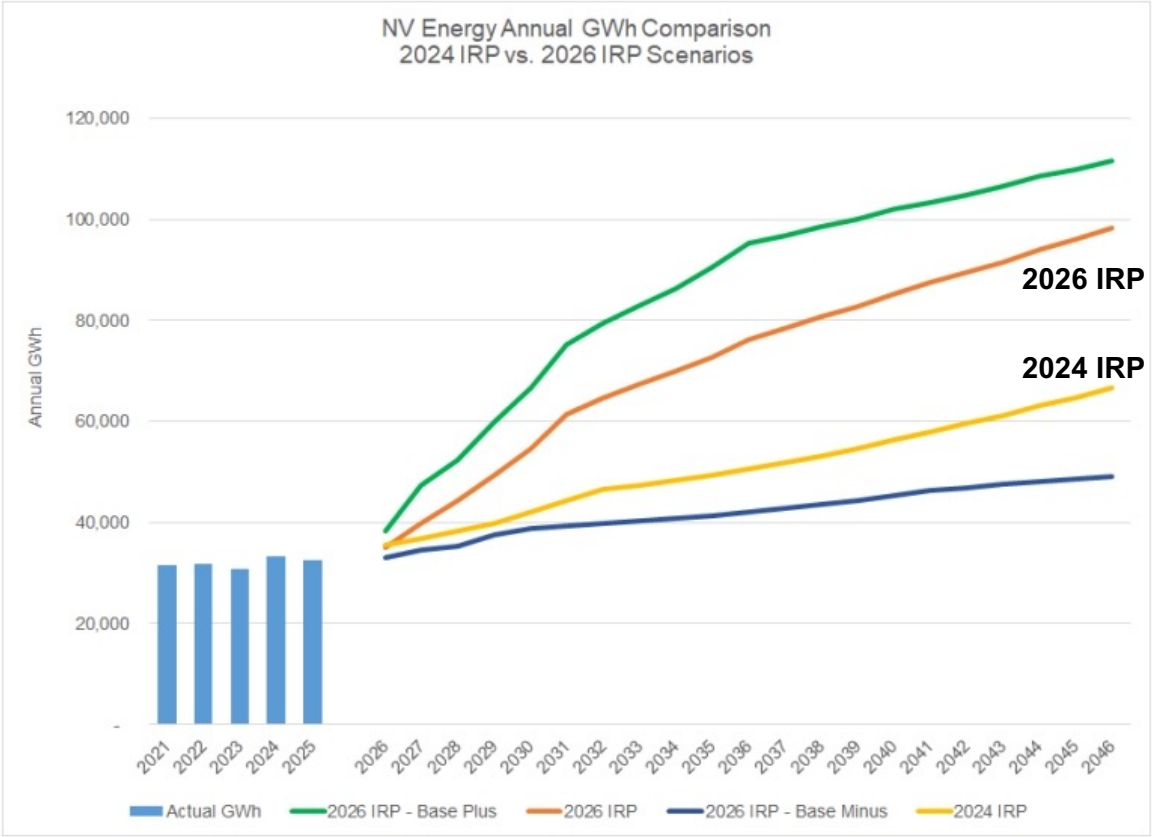
State of Nevada
- 39 projects
- 16,530 MW capacity requested
- 43,754 GWh load growth

Sierra Pacific Power
- Northern Nevada
- 30,554 GWh
- 3,820 MW incremental capacity requested at TRIC

Nevada Power
- Southern Nevada
- 13,200 GWh
- 390 MW incremental capacity requested at the Apex Industrial Park

The 2026 IRP shows steeper growth than what was anticipated in 2024

2024 IRP
5,900 MW of requested capacity
24,633 GWh at Sierra
957 GWh at Nevada Power
Buildout to 2033
2026 IRP
16,530 MW of requested capacity
30,554 GWh at Sierra
13,200 GWh at Nevada Power
Buildout to 2036



NV Energy (2026)

Data centers consume water directly for cooling and indirectly via generation

Direct water use
- Water consumed directly, on-site for cooling
- Shaped by the cooling technology

An Amazon Web Services hyperscale facility (Law, 2025)

Indirect water use
- Water consumed indirectly, off-site via electricity generation
- Typically exceeds direct water use
- May decrease with greater use of renewables

- Water may be consumed elsewhere in the data center value chain (e.g. chip manufacturing)

NV Energy's Frank A. Tracy Generating Station (ThisIsReno, 2014)

Cooling technology shapes direct water use

System	Description
Air	Uses air handlers or air conditioners to circulate cool air May utilize “free cooling,” using cool outdoor air when possible Generally more energy-intensive than evaporative systems but are not nearly as water-intensive
Evaporative	Uses water to reject heat via evaporation in cooling towers Typically more energy-efficient than air cooling but consumes much more water
Direct liquid cooling (DLC)	Direct-to-chip: Circulates water directly to IT hardware in a closed-loop system Immersion: Submerges IT hardware in dielectric fluid May considerably reduce cooling water use moving forward

Efficiency varies across cooling technologies and generating resources

WUE = Water Usage Effectiveness

A measure of how efficiently data centers directly use water (L/kWh)

Direct Water Use

Low WUE:

- 0.12 L/kWh
- Highly efficient

Medium WUE:

- 0.36 L/kWh
- 2023 industry average

High WUE:

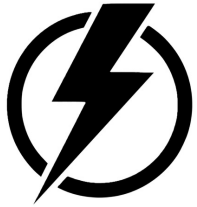
- 1.8 L/kWh
- Highly inefficient
- 2016 industry average

Indirect Water Use

Electricity generation

Water is also consumed indirectly through electricity generation

0.6 L/kWh (NV Energy, 2023)



Under the low and medium WUE scenarios, indirect water demand exceeds direct water demand

Direct water use

- Low WUE:
  - 4,250 AFY
- Medium WUE:
  - 12,800 AFY

Indirect water use

- 21,280 AFY to generate 43,754 GWh

Numbers for 39 new data centers from NV Energy's 2026 IRP

	Annual Post-Buildout Demand
Electricity demand (GWh)	43,754
Electricity cost ($M)	$5,041
Indirect water demand (AFY)	21,283
Indirect water cost ($M)	$2.45
Direct water demand (Low WUE, AFY)	4,257
Direct water cost (Low WUE, $M)	$0.49
Direct water demand (Medium WUE, AFY)	12,770
Direct water cost (Medium WUE, $M)	$1.47

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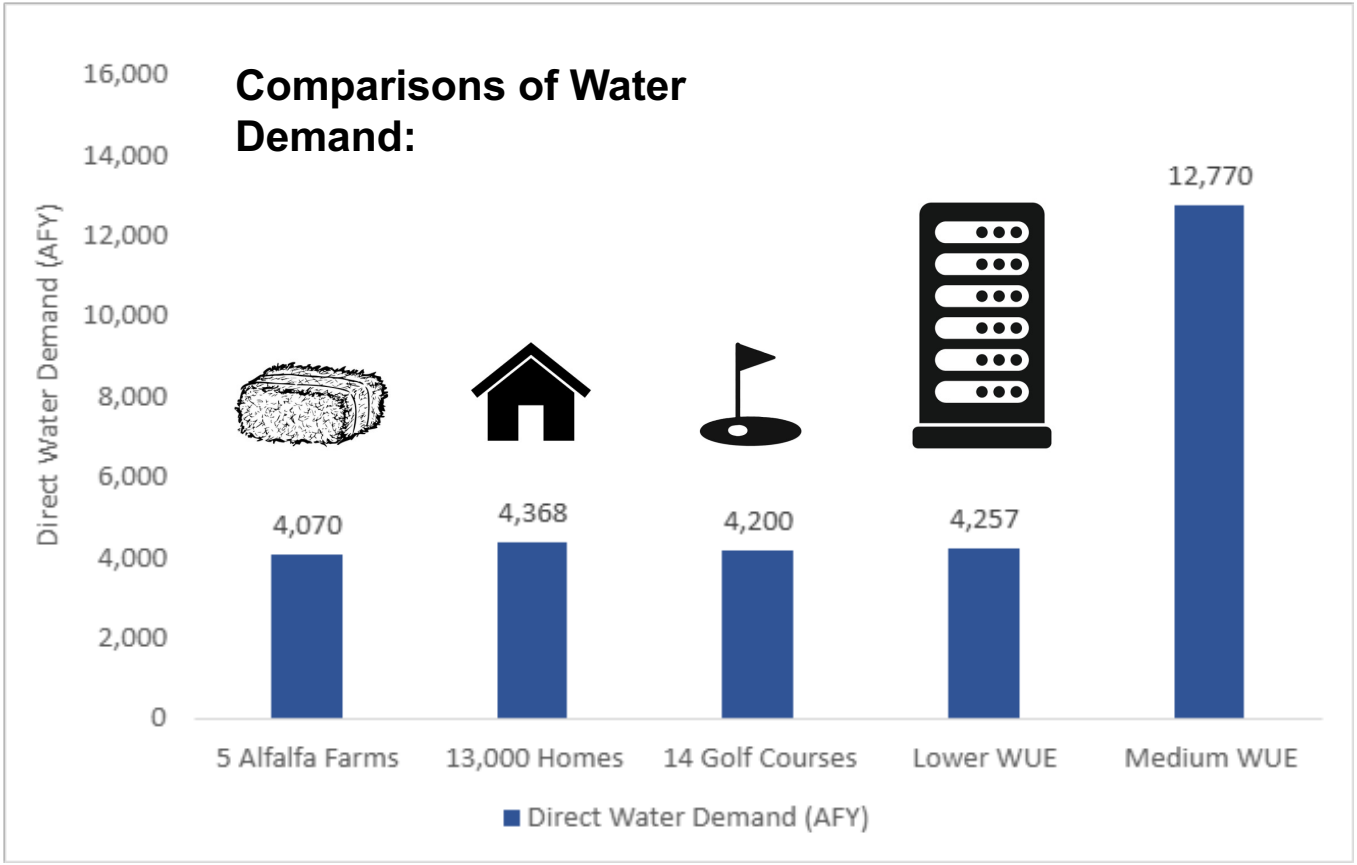
The demands of new data centers may be better understood by way of comparison

Comparisons of Energy Demand:

43,754 GWh is **~96%** of Nevada's **2024 net generation** of 45,528 GWh

16,530 MW is nearly **8x** the 2,080 MW maximum capacity of **Hoover Dam**



Moving forward, there are challenges and opportunities in data center development

Challenges

- Data center clustering
- Interconnection queue
- Supply chain disruptions
- Shortages/backlogs for critical grid components
- Increasing uncertainty

Opportunities

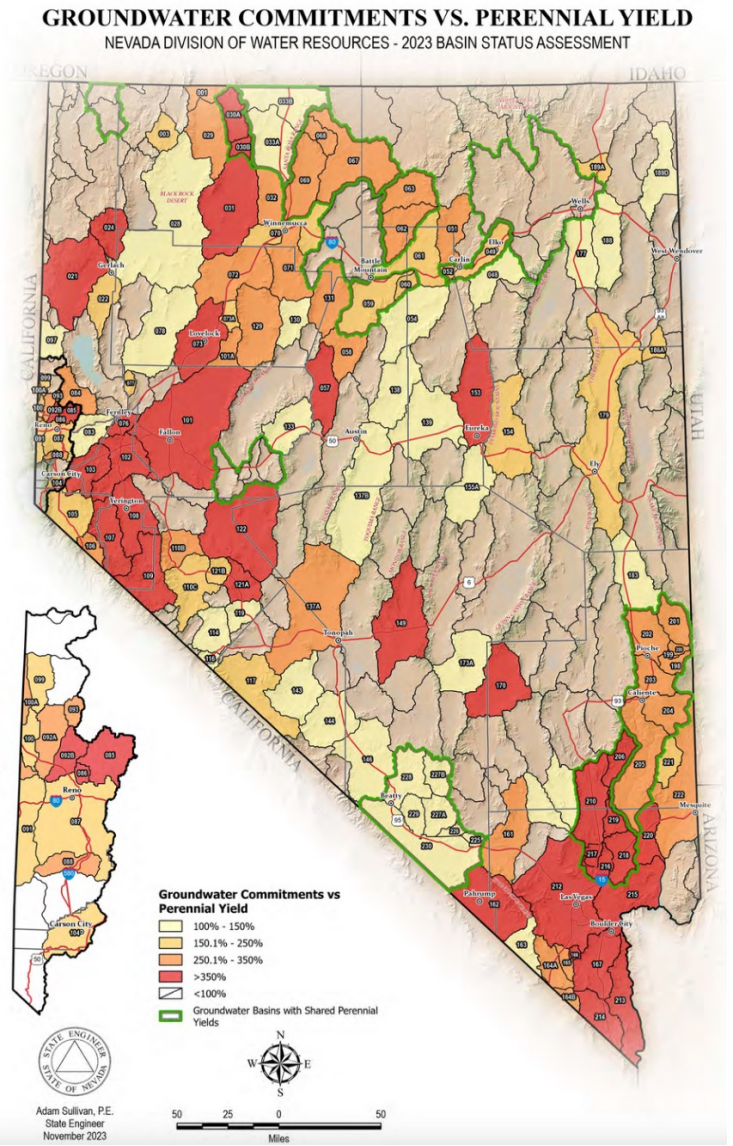
- Use of reclaimed water
- Direct liquid cooling (DLC)
- Load flexibility
- Enhanced algorithmic and/or hardware efficiency

Concerns

- Increasing stress on water and energy resources
  - Rising costs?
- Trade-offs with other stakeholders and priorities (e.g. electrification and affordability)
  - Ratepayer inequity?

Uncertainties remain

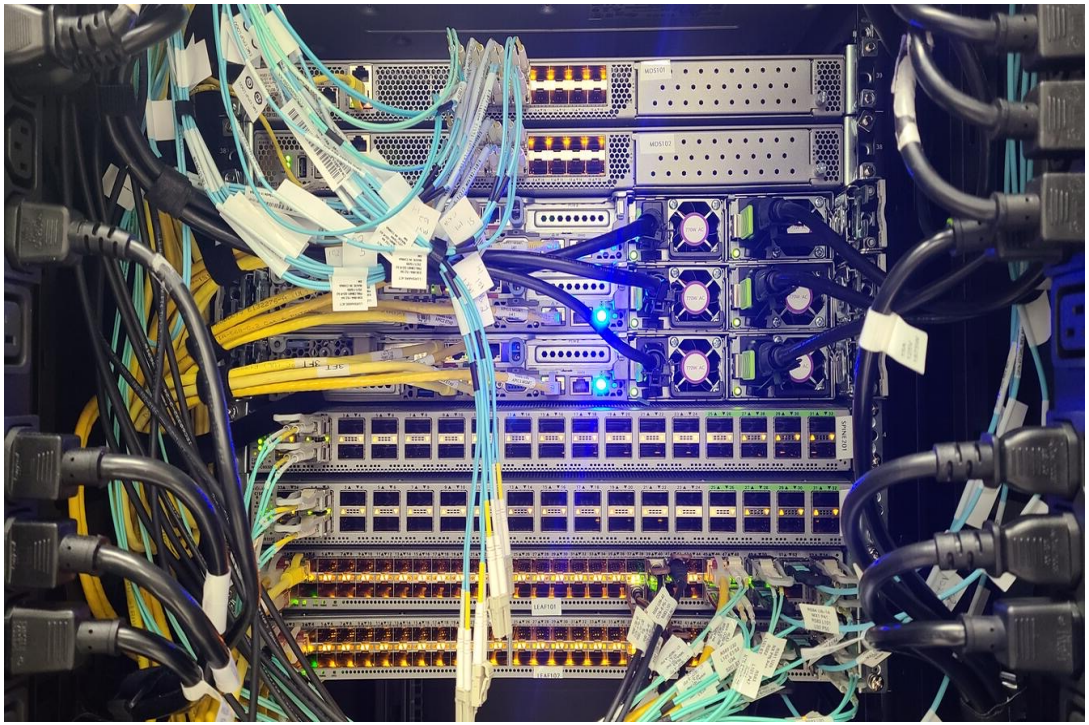
- Potential efficiency gains vs. rapid demand growth
  - Increasing adoption of advanced cooling technologies
- Availability of water
  - Drought, over-appropriation
- Buildout of generation and transmission infrastructure vs. data center expansion
  - Challenges for rural electricity providers
  - Behind-the-meter?



Over-appropriation of groundwater (NDWR, 2023)

Key Takeaways

- Indirect water demand exceeds direct water demand
  - Low WUE: 4,250 AFY
  - Medium WUE: 12,800 AFY
  - Electricity generation: 21,280 AFY
- Electricity is the steepest cost
- Several opportunities to offset demand and/or boost efficiency
  - Reclaimed water, load flexibility, DLC
- Uncertainties remain
  - Need for more data
  - Community preparedness



Network rack at the USGS EROS data center (USGS, 2024)