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POLICY BRIEF

Reducing the Tech Industry's Water Consumption in the Great Salt Lake Basin

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EXECUTIVE SUMMARY

The Office of the Great Salt Lake Commissioner of Utah should a) include specific water efficiency targets for the data center industry in its updated annual Strategic Plan or the Great Salt Lake Integrated Plan; and b) offer educational opportunities to help data centers find financial support to improve water use efficiency. The expansion of the technology sector and the proliferation of data center facilities are major sources of water diversion and consumption within Utah's Great Salt Lake Basin, where freshwater is a precious commodity. This policy brief proposes that the Commissioner's Office set water efficiency targets for the tech sector based on actual water diversion and consumption data collected. Further, the Commissioner's Office should convene meetings or webinars to introduce data center owners and developers to funding opportunities to invest in more efficient systems and reduce their water usage. These actions would support the Commissioner's Office in its efforts to protect the Great Salt Lake and set an example for other states looking for strategies to curb the tech sector's water consumption in drought-prone regions.

BACKGROUND

Water and Energy Usage of Data Centers

There has been growing concern over the last few years regarding the environmental impact of data centers. Data centers are full of servers that emit large amounts of heat during data processing, and many data centers use water to cool these systems. Data centers that house servers running artificial intelligence (AI) models require even more computing

power than typical data centers, and subsequently have a higher demand for water. Based on a recent study from the University of California, Riverside, researchers estimate that AI demand could cause data centers to consume more than 1 trillion gallons of fresh water globally by 2027, equivalent to more than half of the annual water withdrawal in the United Kingdom. In addition to direct water consumption for cooling, data centers also consume water indirectly via the energy source(s) that generate the electricity powering the data centers.

Data Centers in the Great Salt Lake Region

The vast majority of data centers in Utah are located in the Great Salt Lake Basin, where water is increasingly scarce (see Appendix, Figure 1). Water will only become more precious with the projected increase in population in the Greater Salt Lake Economic Region, which is expected to grow from 2.8 million residents in 2020 to 4.6 million residents by 2060.

The data center industry is also growing in the Salt Lake City region, contributing to the region's reputation as a new hub for the technology industry, and giving it the nickname "Silicon Slopes." The Salt Lake City region is currently home to 23 private data centers as well as the National Security Administration's (NSA's) Utah Data Center. Part of the incentive to build in Utah includes the naturally cool, arid climate in the winter, which allows companies to make use of ambient cooling. As rationales for building facilities in the region, data center companies also advertise the affordable electricity, business-friendly policies, and, in the Salt Lake City region specifically, access to fiber infrastructure. Additionally, Utah has notably low water costs. Given the increased prevalence of AI, and the associated need for data center compute resources, this trend in data center development is likely to continue.

Non-public data collected from data centers in the region show that there is great variability in water use between facilities (see Appendix, Table 1), in large part because of differences in size, compute capacity, and cooling technology. In June 2022 — during the lead-up to the lowest water level ever reported in the Great Salt Lake — the NSA's Utah Data Center in Bluffdale used 23,532,000 gallons of water from the Great Salt Lake Basin. Meanwhile, Novva, a low water-use data center in West Jordan, Utah, reported using 85,000 gallons during a similar period.

Office of the Great Salt Lake Commissioner

In 2023, the State of Utah created the Office of the Great Salt Lake Commissioner and tasked it with developing and maintaining an annual strategic plan for how the State and other stakeholders can collaborate on interests relevant to the Great Salt Lake. Past strategic plans, for example, have included targets for how much water certain industries like the agriculture sector should extract from the lake in a given year (see Appendix, Tables 3, 4, and 5 from the current Great Salt Lake Strategic Plan). The Office also advises on the publication of the Great Salt Lake Basin Integrated Plan, an effort run by the Utah Division of Water Resources and United States Bureau of Reclamation, to ensure ongoing water supply in the Great Salt Lake.

RECOMMENDATIONS

The Office of the Great Salt Lake Commissioner should either amend its strategic plan to set efficiency targets for the data center industry or include these targets in the Great Salt Lake Basin Integrated Plan. The Office should also invest in educating data center owners about financial incentives that could help them meet those targets. Doing so will allow the State to better measure and ultimately reduce water consumption by data centers.

More specifically, the Commissioner's Office should take the following steps:

1) The Office of the Commissioner should use the data submitted with this brief to set water use effectiveness (WUE) targets for the data center industry. The Commissioner's Office should partner with the University of Utah's Great Salt Lake Strike Team to continue to collect data about water consumption and diversion by data centers to keep these targets up to date.

First, the Commissioner's Office should set targets for the data center industry. Currently, the Commissioner's Office sets water targets for industries including the Agriculture, Municipal & Industrial sector, and Mineral Extraction Sector (see Appendix, Tables 3, 4, and 5 from the current Great Salt Lake Strategic Plan). The Office should create a separate target for the data center industry so it can evaluate this industry's regional impact with the same granularity as other high-impact sectors.

The Commissioner's Office should use a different target in the data center sector than it uses in other sectors. Right now, the Office includes conservation targets for other sectors based on acre-feet. We believe a more appropriate target for the data center sector is Water Usage Effectiveness (WUE), the ratio between a data center's water usage and its energy consumption. WUE is a better metric because it accounts for the water used per kilowatt-hour of power, unlike other measures that fail to consider variations in data center size and power usage. Setting this target in either the revised strategic plan or the Great Salt Lake Basin Integrated Plan would align with the Office's goal to "allow for more informed decision-making and more tools to solve complex lake issues."

To help set this target, this proposal package contains a Great Salt Lake Basin Data Center Water Use Fact Sheet that includes water use data collected from seven local data centers via Government Records Access and Management (GRAMA) requests. We also provide estimated best-case WUEs (see Appendix, Table 2). As explored in more detail in the Appendix, we recommend that the Commissioner's Office set their WUE target to 0.25, which reflects targets achieved by industry leaders in the space.

To ensure targets remain up to date, the Commissioner's Office should introduce a new data collection project to its ongoing collaboration with the Great Salt Lake Strike Team at the University of Utah. The Strike Team should submit annual GRAMA requests to update a database of data center water use in the state. Given the Strike Team's stated goal of "enhancing Utah's strategies to increase water levels" of the Great Salt Lake, this project is well-aligned with the existing partnership. Team members have verbally expressed enthusiasm for this collaboration.

This data could live in the Great Salt Lake Data Hub, a resource identified in the Work Plan for the Great Salt Lake Basin Integrated Plan to be developed in coordination with the U.S. Geological Survey. Once this data

is collected, it should be included in the upcoming Integrated Plan, for example in Appendix Tables 3, 4, and 5 of the current strategic plan, and used to update WUE targets. It should also be included on the Office of the Commissioner's website, in a new section entitled "Data Centers" under the Industry & Recreation tab.

Establishing a data tracking system for water usage will allow the Commissioner's Office to continue to set industry specific goals and encourage the industry to take part in regional conservation efforts. Furthermore, increased transparency will allow other regional actors — such as advocacy groups, residents, and journalists — to understand the impact of the growing data center industry in the area.

For more information about this proposal, please see the Great Salt Lake Basin Data Center Water Use Fact Sheet, which provides more information on data center water use and the specific targets the Commissioner's Office should set.

2) The Commissioner's Office should 1) host an informational webinar with local private data centers as the target audience, and 2) set up a meeting with the NSA's Utah Data Center to discuss opportunities to defray costs of efficiency retrofits.

The Commissioner's Office should offer a webinar to publicize available funding opportunities for existing data centers to reduce their water use, and for development of new water efficient data centers. The webinar should focus on sharing information about incentive programs for funding private industry data centers, and highlight the IRS's energy efficient commercial buildings deduction, which is available for energy efficient commercial building retrofit properties (EEBRP) and energy efficient commercial building properties (EECBP). While the primary focus of the deduction is on energy efficiency, improved systems often contribute to water efficiency, particularly in HVAC and plumbing systems.

The Commissioner's Office should also set up a meeting with the NSA to discuss opportunities to defray the costs of efficiency retrofits. The meeting with the NSA's Utah Data Center should focus on government data centers, and highlight the potential to use the Department of Energy's Energy Savings Performance Contracting (ESPC) to finance the upfront costs associated with efficiency retrofits.

Water use data suggests that only some data centers have efficient cooling systems. Data centers often cite cost as a prohibitive barrier to improving cooling system efficiency, suggesting they may be unaware of funding opportunities. Advertising these opportunities through webinars would enable the Commissioner's Office to influence data centers to decrease their dependency on local water use by identifying economic incentives to help pay for these retrofits. This model has gained traction elsewhere: the Good Food Institute has offered webinars with the Department of Energy to inform alternative protein companies about relevant public funding opportunities. To further the impact and increase their reach, they recorded and publicly published the webinars.

Together, these steps will contribute to the Commissioner's Office's underlying goal of halting and ideally reversing the decline of water in the Great Salt Lake, while bringing increased clarity about the role of data centers and the tech industry at large within the region.

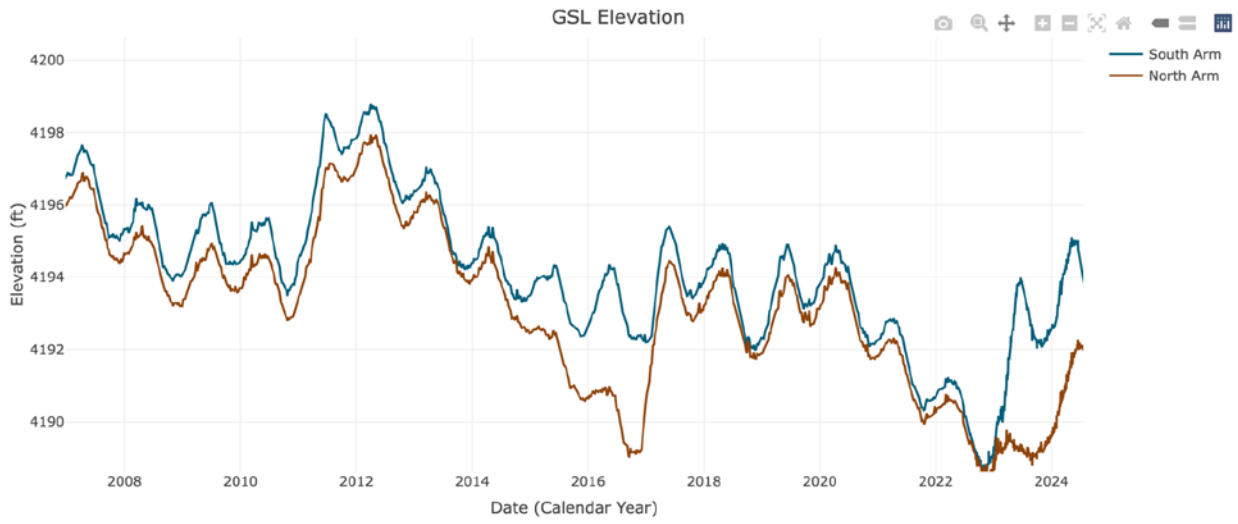
To implement this recommendation, please see the sample operational plans for the economic incentive webinar and agendas for meetings with the NSA.

Appendix

See below for graphs and tables referred to in the main text of our policy brief.

Figure 1: Great Salt Lake Elevation Over Time

The graph below shows the differences in Great Salt Lake (GSL) elevation over the last decade and a half. This graph shows that the elevation of the Salt Lake has been trending downward. (Recent increases in 2023/2024 are due to abnormally heavy snowfall years, but overall trends are going down.)



Source: Utah Division of Water Resources, "Great Salt Lake Elevation," accessed October 2024, https://water.utah.gov/great-salt-lake-elevation/.

Table 1: Snapshot of Data Center Water Usage

The table below shows annual differences (2024 includes only the first seven months of data) between seven data centers in the Great Salt Lake Basin. The data in this table were collected via GRAMA requests.

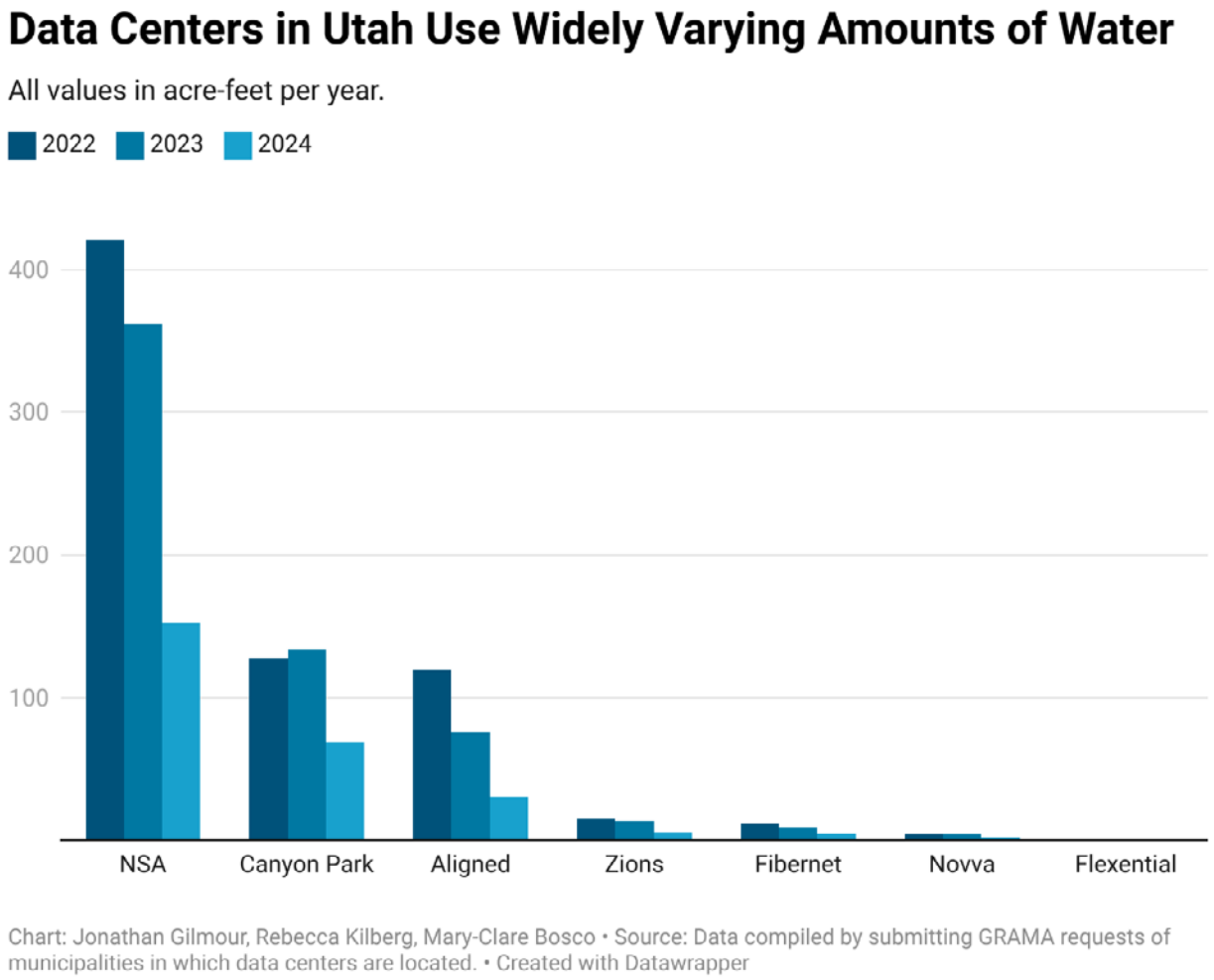


Table 2: Estimated Best Case Data Center Water Use Effectiveness (WUE)

The table below provides estimates of "water use effectiveness" (WUE) of key data centers in the Great Salt Lake region. The table is based on collected data and an assumption of 100% power draw 24/7/365, using publicly available data from Wired and Data Center Map to estimate power draw. Ideally, in the future, data centers will calculate and share their own WUE data to get more accurate estimates. Through our calculations, we find that there is great variability in WUE across data centers.

Estimated Best Case Data Center Water Use Effectiveness (WUE)

WUE takes into account data center energy consumption and water usage. The lower the WUE, the more efficiently the data center uses water resources. NSA's Utah Data Center has a high WUE, meaning that it does not use water as effectively as other data centers. Novva, a low water use data center, has a very low WUE. A 2016 study found the average data center WUE is 1.8L per 1 kWh (WUE of 1.8), although it's worth noting that more recent data from industry giants Meta and Amazon show averages hovering between 0.18 and 0.3 for 2017-2023*.

Datacenter	Capacity (MW)	Water usage 2022 (acre-feet)	Best Case WUE 2022	Water usage 2023 (acre-feet)	Best Case WUE 2023
NSA	65	420.44	0.910	362.15	0.784
Novva	120	4.54	0.005	4.63	0.005
Aligned	82	119.44	0.205	75.82	0.130
Fibernet	6	12.23	0.287	9.73	0.228
Flexential	0.57	0.88	0.217	0.95	0.235

*This chart shows estimated best case data center water use effectiveness. WUE = Data Center Water Consumption (in liters) / IT Equipment Energy (in kilowatt hours). We calculated maximum possible kWh the data centers could draw, based on their publicly available capacity and assuming 100% power draw 24/7/365. This represents best case WUE: it is unlikely that data centers are drawing 100% power at all times. *Figures for Meta and Amazon are reported by the companies and are therefore not best case WUE.*

Table: Jonathan Gilmour, Rebecca Kilberg, Mary-Clare Bosco • Source: Water usage data compiled by submitting GRAMA requests of municipalities in which data centers are located. Capacity data from datacentermap.com and Wired. Meta and Amazon WUE data from sustainability reports. • Created with Datawrapper

Based on the estimates we calculated in this table, we recommend that the Commissioner's Office set their WUE target to 0.25. This goal is in line with the data centers of industry leaders such as Amazon and Meta, which both have reported average WUE of 0.18 in 2023. Setting this target will allow the Commissioner's Office to hold the data centers accountable for their impact on the Great Salt Lake Basin water supply.

Tables 3, 4, and 5 from the current Great Salt Lake Strategic Plan

The tables below are drawn from the current version of the Great Salt Lake Strategic Plan. They show water and conservation targets for certain sectors like the agriculture and municipal sector.

Our project proposes that the Commission set a separate water target for the tech sector. That sector is currently embedded in the "Municipal and Industrial" row below.

More information about these tables can be found in the Great Salt Lake Strategic Plan itself.

TABLE 3: CONSERVATION STRATEGIES TO PREVENT FURTHER DECLINE WITH DROUGHT INFLOWS. TOTAL CONSERVATION REQUIRED 355 KAF/YR.

Sector	Average Depletion 1989-2021	Equal Percentage Reductions		Primary reliance on municipal and industrial conservation		Primary reliance on agricultural conservation	
		Conservation reduction % and kaf/yr		Conservation reduction % and kaf/yr		Conservation reduction % and kaf/yr	
Agriculture	1,323	19%	254	10%	132	23%	302
Municipal and Industrial	358	19%	69	43%	153	10%	36
GSL Mineral Extraction	165	19%	32	43%	70	10%	17
Total	1,846	-	355	-	355	-	355

TABLE 4: CONSERVATION STRATEGIES TO FILL TO LOWER HEALTHY LEVEL (4,198 FEET) IN 20 YEARS WITH CONTEMPORARY INFLOW SCENARIO. TOTAL REQUIRED CONSERVATION 531 KAF/YR.

Sector	Average Depletion 1989-2021	Equal Percentage Reductions		Primary reliance on municipal and industrial conservation		Primary reliance on agricultural conservation	
		Conservation reduction % and kaf/yr		Conservation reduction % and kaf/yr		Conservation reduction % and kaf/yr	
Agriculture	1,323	29%	381	10%	132	36%	479
Municipal and Industrial	358	29%	103	76%	273	10%	36
GSL Mineral Extraction	165	29%	47	76%	126	10%	16
Total	1,845	-	531	-	531	-	531

TABLE 5: CONSERVATION STRATEGIES TO FILL TO LOWER HEALTHY LEVEL (4,198 FEET) IN 30 YEARS WITH CONTEMPORARY INFLOW SCENARIO. TOTAL REQUIRED CONSERVATION 471 KAF/YR.

Sector	Average Depletion 1989-2021	Equal Percentage Reductions		Primary reliance on municipal and industrial conservation		Primary reliance on agricultural conservation	
		Conservation reduction % and kaf/yr		Conservation reduction % and kaf/yr		Conservation reduction % and kaf/yr	
Agriculture	1,323	26%	338	10%	132	32%	419
Municipal and Industrial	358	26%	91	65%	232	10%	36
GSL Mineral Extraction	165	26%	42	65%	107	10%	16
Total	1,845	-	471	-	471	-	471

Source: Office of the Great Salt Lake Commissioner, State of Utah, Great Salt Lake Strategic Plan, by Brian Steed (2020), https://greatsaltlake.utah.gov/wp-content/uploads/Great-Salt-Lake-Strategic-Plan-1.pdf

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