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Atmospheric Water Generation: A Deep Dive into the Technology and Potential Use Cases

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Overview

Atmospheric water generation is a technology that collects and condenses water vapor from the air to produce liquid water. AWG units have the potential to address water shortage problems by providing a substantial and consistent water supply that does not rely on surface water, groundwater, wells, plumbing, or other water infrastructure. Each atmospheric water generator is a standalone system, and many are mobile units. Some types of AWG do not rely on a power source at all, and others can be made more sustainable and carbon-free when integrated with renewable energy or waste heat. Certain AWG units have been specifically approved by the TCEQ and EPA as a potable water supply source.[1,2]

Types of AWG

Fog/Dew Collection

The earliest forms of atmospheric water generation date back to ancient civilizations who used various technologies to collect fog or dew for drinking water. The Aztecs hung mesh-like structures of woven grasses to collect fog, and indigenous communities in the Canary Islands collected fog water that dripped from trees, to name just a couple examples.[3] Modern fog collection technology relies on the same simple principle: fog, blown by the wind, is driven into a mesh which collects the small droplets into larger ones that drip down into a storage container. Water yield depends on fog density, averaging about 1-2.5 gallons a day per square meter of mesh. Dew collection systems vary, as dew can be collected on many surfaces so long as the surface temperature is lower than atmospheric water vapor. In general, dew collection can yield about a pint of water per square meter of surface per day.[4]

One community in Southwest Morocco, despite being in an arid area, has all its water needs met from fog collection, with enough to spare for home gardens and additional crops to sell.[5] Their fog collector is also connected to households' water supply though pipes, saving time that would have otherwise been spent walking miles to collect water from a well. Similarly, fog collection also supplies water to communities in the highly arid Atacama Desert near Lima, Peru.

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[1] Moses West Foundation: AWG Contracting. (2016). *Water Test Results.* [PDF]. Personal Communication.
[2] United States Environmental Protection Agency. (2019, November 13). Atmospheric Water Generation Research. https://19january2021snapshot.epa.gov/water-research/atmospheric-water-generation-research_.html
[3] Verbrugghe, N., & Khan, A. Z. (2024). Atmospheric water harvesting as a sustainable and resilient resource in arid climates: gaining insights from ancient techniques. Water Supply, 24(11), 3810-3830. https://doi.org/10.2166/ws.2024.245
[4] Same as above.
[5] WasserStiftung. (2019, May 17). World's largest Fog-collector CloudFisher in Morocco – Producing drinking water from fog [Video]. YouTube. https://www.youtube.com/watch?v=0F7CQMd6mQ4

Seven fog collectors, installed by the company FogQuest, produce about 600 gallons of water a day.[6] Fog collection is only suitable for environments with a lot of fog, but it is very effective once installed and has the potential to transform communities by providing not only enough drinking water, but additional water for economic activities. Fog and dew collection should be implemented wherever possible, as these technologies provide a sustainable supplemental water supply that can ease the strain on other water sources. In addition, ancient technologies can be used as inspiration for modern AWG development.

Fog collecting structures, from "Clearing the fog on water conservation."[7]

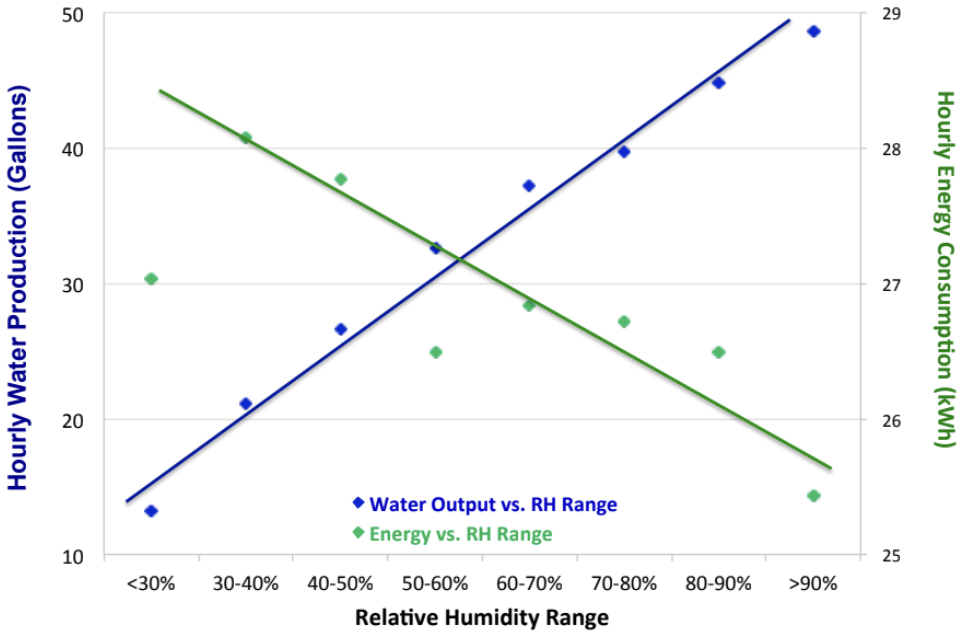
Active Refrigeration / Vapor Compression & Refrigeration Cycling (VCRC)

In the most common type of atmospheric water generation technology, air is cooled down past the dew point, forming condensation which is collected as liquid water. Although different manufacturers have slightly different systems, the basis of the technology relies on blowing air over a cooled surface such as steel coils filled with refrigerant. Many AWG systems work through vapor compression and refrigeration cycling (VCRC), which involves evaporation, compression of the water vapor to increase the heat of the gas, and then condensation into liquid water when the vapor returns to a cooler temperature. The water is then purified through multiple processes

[6] Cho, R. (2011, March 7). The Fog Collectors: Harvesting Water from Thin Air. Columbia Climate School. https://news.climate.columbia.edu/2011/03/07/the-fog-collectors-harvesting-water-from-thin-air/
[7] Vaidyanathan, J. (2017, July 5). Clearing the fog on water conservation. India Water Portal. https://www.indiawaterportal.org/agriculture/farm/clearing-fog-water-conservation

such as filtration, UV light treatment, chlorination, and reverse osmosis.[8] The resulting water is distilled and suitable for potable, clinical, laboratory, and manufacturing uses. Minerals can also be added in for taste. This type of AWG is functional at temperatures above 40°F and relative humidity (RH) levels as low as 20%, though efficiency increases as temperature and humidity rise.[9] These systems perform best in warm, humid environments such as warm coastal cities and the tropics.

For example, the Moses West Foundation's AWG units have optimal operating conditions of 85% RH and 86°F.[10] In 2015, their AWG5000 was tested at Trinity University in San Antonio, Texas from June 4 through August 6. In this climate, the unit produced an average of 940 gallons per day at 0.697 kWh/gallon. Typical of the summer months in San Antonio, humidity was most frequently recorded at 80-90% RH. The AWG5000 model has since been updated and is both more energy-efficient and can produce even more water.[11]



AWG500 hourly energy consumption and water production rates associated with relative humidity over the period of June 4 – August 6, 2015 in San Antonio, TX. Graphic from "Air to Water Technology: AWGTechnology AQ5000 Atmospheric Water Generation (AWG) Unit Performance and Operations Assessment".[12]

[8] Watergen. (2020, August 23). Watergen – how it works? [Video]. YouTube. https://www.youtube.com/watch?v=VG7C9HosSTk&t=6s
[9] Watergen. (2025). The Technology. https://watergen.com/technology/
[10] Shepard, L. E., Adeoye, O. O., Wright, M. (2015). Air to Water Technology: AWGTechnology AQ5000 Atmospheric Water Generation (AWG) Unit Performance and Operations Assessment. Texas Sustainable Energy Research Institute at UTSA. https://awgcontractingus.com/wp-content/uploads/2024/08/Academic-Assesment.pdf
[11] Moses West Foundation. (2018). *Atmospheric Water Generating Technology.* [PDF]. Personal Communication.
[12] Same as footnote 10.

Refrigeration-based AWG can be an energy-intensive technology and potentially a significant source of carbon emissions, depending on how that energy is sourced. However, it is still a promising option for use in large-scale industrial applications such as data centers, especially if paired with renewable energy, as it is easily scalable and can produce large quantities of water. According to a subject matter expert from the Moses West Foundation, though their current largest unit sold (the AWG5000) can produce up to 2,220 gallons a day (about 2.5 acre-feet a year), larger units with much greater water production capacity could feasibly be built if there was demand for one.[13]

The mobile AWG800 model produced by the MWF.[14]

AWG5000 from the MWF.[15]

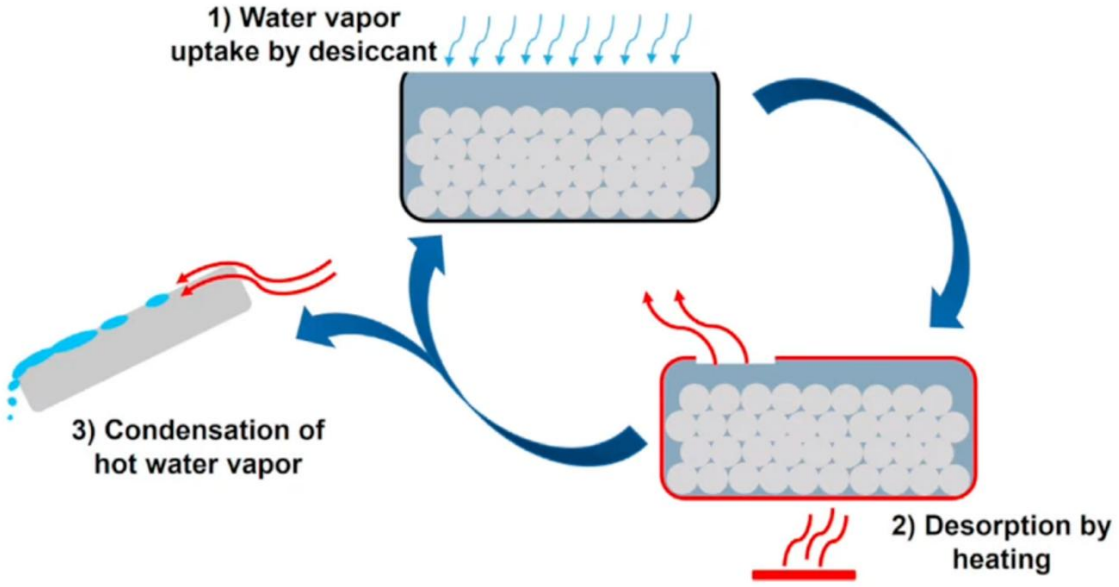
Sorption-Based Technology

Another method of atmospheric water generation is sorption-based technology, which uses a desiccant to draw water vapor from the air. Water vapor molecules collect on the surface of the sorbent material and are released by an input of heat energy, such as sunlight. The concentrated water vapor then condenses and can be collected. Unlike refrigeration-based AWG, this technology is viable even in environments with relative humidity under 20%, making it the most feasible option in very arid conditions. One review article compared five solar powered sorption-based AWG units, finding that the systems ranged in water collection from about ¼ to ¾

[13] Interview with subject matter expert from Moses West Foundation.
[14] Moses West Foundation. (2023). *AWG800 Atmospheric Water Generator.* [PDF]. Personal Communication.
[15] Tabibi, A. (2022, July 26). Pulling Water from Thin Air: Moses West. *Green.org.* https://green.org/2022/07/26/pulling-water-from-thin-air-moses-west/

of a gallon a day.[16] Though viable in very dry environments, productive with only solar energy, and often small and portable, the biggest drawback to this technology is the low water yield.

The company AirJoule uses a metal-organic framework as a sorbent to capture water combined with a vacuum system that uses low-grade waste heat (heat that is too low in temperature to be efficiently used in high-temperature industrial processes) to release the water for condensation and collection.[17] The AirJoule AWG has the potential to be paired with data centers as it can use the waste heat produced by data center operations to generate water, either for evaporative cooling or to replenish line losses in closed loop systems. The company has been endorsed by Google, Microsoft, and other data center operators, and their technology is promising for use in "net-zero" data centers. Considering that "40% of all planned data centers in the US are in areas with high or extremely high water stress," it is imperative that water sustainability is a key focus of data center design.[18]



Process diagram of sorption-based atmospheric water generation. Graphic from "Atmospheric Water Generation Technologies" by Asianometry.[19]

[16] Tashtoush, B., Alshoubaki, A. (2023). Atmospheric water harvesting: A review of techniques, performance, renewable energy solutions, and feasibility. *Energy, 280*(1), 128-186. https://doi.org/10.1016/j.energy.2023.128186
[17] AirJoule. (n.d.) *AirJoule Technologies.* https://airjouletech.com/technology/
[18] AirJoule. (2025, September 20). AirJoule Selected as Winner of Net Zero Innovation Hub Competition and Invited to Collaborate with Google, Microsoft, and other Industry Leaders on Water-Sustainable Data Centers. *AirJoule Technologies.* https://airjouletech.com/2025/09/25/airjoule-selected-as-winner-of-net-zero-innovation-hub-competition-and-invited-to-collaborate-with-google-microsoft-and-other-industry-leaders-on-water-sustainable-data-centers/
[19] Asianometry. (2023, May 19). *Atmospheric Water Generation Technologies* [Video]. YouTube. https://youtu.be/zhgRWFBdqj8?si=cZ7aAYsqlh3EEyqq

Current Uses of AWG

Personal/Home Use

There are many brands on the market that sell small-scale AWGs for home and office use. These machines draw water from ambient air using active refrigeration, like a dehumidifier, and generally only require a wall outlet to set up. Prices increase as water generation capacity increases—a 10 L/day (2.6 gallon) unit starts around $1,000, while a 20 L/day (5.3 gallon) unit is around $2,000.[20] The largest personal use units available are around $30,000 and capable of producing upwards of 120 gallons a day, or slightly less than half of the average US family's daily water consumption.[21, 22] Industrial size units that can produce thousands of gallons a day generally require special contracting.

An 8 gal/day atmospheric water generator sold by Innovaqua.[23]

Disaster Relief & Humanitarian Efforts

Readily deployable AWG units can be extremely valuable in disaster relief situations, such as after a hurricane or during a water supply crisis, where a source of clean, reliable water is needed immediately. For example, the Moses West Foundation provided one of their AWG800 units, capable of producing about 200 gallons of water a day, to communities of Jamaican

[20] Gold, S. (2025, December 18). Best Atmospheric Water Generators: Make Water from Air. *TruePrepper.* https://trueprepper.com/atmospheric-water-generator/
[21] Genesis Systems. (n.d.). *WaterCube 100.* Retrieved February 4, 2026, from https://www.genesissystems.com/configure/watercube100
[22] United States Environmental Protection Agency. (2025, March 24). *WaterSense: Statistics and Facts*. https://www.epa.gov/watersense/statistics-and-facts
[23] Innovaqua. (n.d.) *NUBE SS30: Atmospheric Water Generator (8 Gal/day) 110V/220V*. Retrieved February 4, 2026, from https://www.innovaqua.shop/products/nube

Maroons who have been losing land and water resources over the years to deforestation and development but are now able to stay water independent and maintain their autonomy. The AWG800 was even able to survive Hurricane Melissa, which hit Jamaica in October 2025.[24] The Moses West Foundation also provided an AWG800 to Flint, Michigan during their water crisis and a completely solar-powered AWG5000, capable of producing about 1,500 gallons daily, to the island of Vieques, Puerto Rico after Hurricane Maria.[25] Other AWG companies such as Watergen have also provided AWG units to communities around the world in need of a reliable water supply.[26]

Watergen's GEN-M unit installed at an elementary school in Curepto, Chile. Image from Watergen - Case Studies.[27]

Military Applications

AWG has been of interest to the United States Department of Defense due to its importance in military operations. Many AWG companies are contracted by the military, and the military is the primary purchaser of AWG units from the Moses West Foundation, according to a subject matter expert from this organization. Water is indispensable to military missions, yet can

[24] Richard Currie [chiefrichardcurrie]. (2025, October 31). *Ambassador @anu.tafari.zion.el33 provides update on the Atmospheric Water Generator in Accompong Town* [Video]. instagram.com/reel/DQfXKNjDgGy/?utm_source=ig_web_copy_link&igsh=MzRlODBiNWFlZA%3D%3D

[25] Moses West Foundation. (n.d.) *Moses West Foundation: Water is Free.* https://moseswestfoundation.org/mwf/

[26] Watergen. (n.d.). *Case Studies: Creating Water from Air around the World.* https://watergen.com/case-studies/

[27] Watergen. (2025, June 11). *Watergen provides water from air solution to Chilean school.* https://watergen.com/case-studies/watergen-provides-water-from-air-solution-to-chilean-school/

be a major challenge to provide, especially in remote and resource-scarce locations. Traditionally, treated water must be delivered to deployed troops, but this method can be risky and logistically intensive.

The U.S. Air Force Institute of Technology has researched AWG in a variety of climates in the Indo-Pacific region, where the island geography makes it particularly challenging at times to supply water. They found that AWG was able to produce a steady supply of water year-round in locations such as the Philippines (about 80°F and 80% RH), though it was not as viable a solution in arid inland regions.[28] The Defense Advanced Research Projects Agency has also worked on developing sorbent materials to use in small, portable, lightweight AWG systems for use in remote arid regions that can meet the daily drinking water needs for up to 150 people.[29]

Pairing with AC units

Air conditioning units provide a form of atmospheric water generation, producing liquid water as a byproduct of cold air. In a hot, humid climate, a simple residential central air conditioning system can drip 20 gallons a day.[30] Some businesses and institutions already incorporate AC condensate into their water supply for non-potable uses, such as the University of Texas in Austin and Credit Human's 12-story headquarters in San Antonio.[31] Though collected AC condensate needs filtration to be safe for drinking, it is still a worthwhile strategy to reduce water use, considering that "up to 95% of a commercial building's water demands are non-potable."[32]

AC condensate also needs much less filtration to reach drinking-water quality than other water reuse sources such as graywater (wastewater from sources like showers and washing machines) or stormwater. One hotel in the United Arab Emirates implemented a combined air conditioning and potable water production system, which was able to generate 56% of the hotel's daily water demand. Though it was slightly more energy-intensive than the regular HVAC system, cost analysis showed that it was more economically viable.[33] Recapturing water that is otherwise

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[28] De La Serna, J., Mbonimpa, E. (2025). Atmospheric Water Generation to Support Indo-Pacific Operations. *Society of American Military Engineers, 117*(758), 51-53. https://www.jstor.org/stable/48828672

[29] Defense Advanced Research Projects Agency. (n.d.) *AWE: Atmospheric Water Extraction*. https://www.darpa.mil/research/programs/atmospheric-water-extraction

[30] Graham, S. (2026, January 16). How Much and Where Should an A/C Unit Drip? *Networx*. https://www.networx.com/article/how-much-and-where-should-an-air-conditi

[31] Gilker, G., & Leurig, S. (2024). Net Zero Water Toolkit. *Texas Water Trade.* https://texaswatertrade.org/wp-content/uploads/2024/04/TWT_24_NetZero_Toolkit_2024.pdf

[32] Same as above

[33] Magrini, A., Cattani, L., Cartesegna, M., Magnani, L. (2015). Production of Water from the Air: The Environmental Sustainability of Air-conditioning Systems through a More Intelligent Use of Resources. The Advantages of an Integrated System. *Energy Procedia, 78* 1153-1158. doi.org/10.1016/j.egypro.2015.11.081

wasted from AC units is not only environmentally beneficial, it is also economically beneficial, especially if used for non-potable water needs.

Costs

As of November 2025, the residential electricity rate in Texas was 15.23¢ per kWh, and the commercial rate was 8.60¢ per kWh.[34] Large-scale AWG units, when run using the power grid, have daily electricity use costs in the hundreds of dollars. However, units powered with renewable energy eliminate this expense.

Table 1: Comparison of the largest unit sold by different AWG companies.

Product	Water production capacity	Power consumption (efficient conditions)	Operational range	Cost
Moses West Foundation – AWG5000[35]	Up to 8,400 L/day (2,200 gal)	0.16 kWh/L	≥ 40 °F ≥ 20% RH	$450,000
Watergen – GEN-L[36]	Up to 6,000 L/day (1,585 gal)	0.35 kWh/L	≥ 60 °F ≥ 20% RH	(not provided)
AirJoule – A1000[37]	Up to 3,000 L/day (790 gal)	0.15 kWh/L with waste heat provided 0.4 kWh/L as a stand-alone system	≥ 40 °F ≥ 20% RH	< $200,000
Genesis Systems – WaterCube 1000[38]	3,785+ L/day (1000+ gal)	0.26 kWh/L	≥ 50 °F ≥ 40% RH	> $500,000

[34] Electric Choice. (n.d.) *Electricity Rates.* Retrieved November 2025, from https://www.electricchoice.com/electricity-prices-by-state/
[35] Moses West Foundation. (2018). Atmospheric Water Generating Technology. [PDF]. Personal Communication.
[36] Watergen. (n.d.). *Discover GEN-L.* https://watergen.com/product-page-gen-l/
[37] AirJoule. (n.d.). *A1000 Technical Specifications.* https://airjouletech.com/wp-content/uploads/2025/02/A1000-specifications.pdf
[38] Call with Genesis Systems representative.

Table 2: Daily operational cost comparison for the largest unit from different AWG companies.

Product	Cost per day in Texas (assuming max water production) - Residential Rate (15.23¢/kWh)	Cost per day in Texas (assuming max water production) - Commercial Rate (8.60¢/kWh)
Moses West Foundation – AWG5000	$204.70	$115.58
Watergen – GEN-L	$319.83	$180.60
AirJoule – A1000	$68.54 (with waste heat provided) $182.76 (stand-alone system)	$38.70 (with waste heat provided) $103.20 (stand-alone system)
Genesis Systems – WaterCube 1000	$149.88	$84.63

Table 3: Cost comparison of initial installation for home water sources.[39, 40]

Residential system for 3-4 people	**Atmospheric Water Generator ***	**Drilled Well System (450') ****	**20,000-gallon Rainwater Harvesting System**
	$8,000–$15,000	$50,000-$70,000	$24,000-$35,000

*Not including electricity costs.

**Submersible pumps for wells have a monthly cost around $20-$98, for a power range of 0.5-2.5 kW.[41]

Some companies, such as Genesis Systems, have a cost-per-gallon calculator that will provide an estimate of how much an AWG unit costs to operate over time. For example, the WaterCube 10 sold by Genesis Systems, which can produce 10 gallons a day, would provide water at $0.413 per gallon at electricity rates of $0.15 per kWh. Over the course of a year, this would amount to $1507.45, not including the initial cost of the unit.[42]

[39] Hill Country Alliance. (n.d.). *Rainwater Harvesting in Central Texas: A Practical Guide.* https://hillcountryalliance.org/wp-content/uploads/2025/08/Rainwater-Harvesting-Issue-Paper_August-2025_.pdf
[40] Philips, C. (2025, November 10). Unlocking the Truth: Atmospheric Water Generators Cost. *Quality Water Treatment.* https://qualitywatertreatment.com/blogs/water-company/atmospheric-water-generators-cost?
[41] SolarTech, (2025, November 11). *How Much Electricity Does a Well Pump Use? Complete 2025 Guide.* https://solartechonline.com/blog/how-much-electricity-does-well-pump-use/
[42] Genesis Systems. (n.d.). *WaterCube 10.* Retrieved February 4, 2026, from https://www.genesissystems.com/products/watercube10

AWG and Climate in Texas

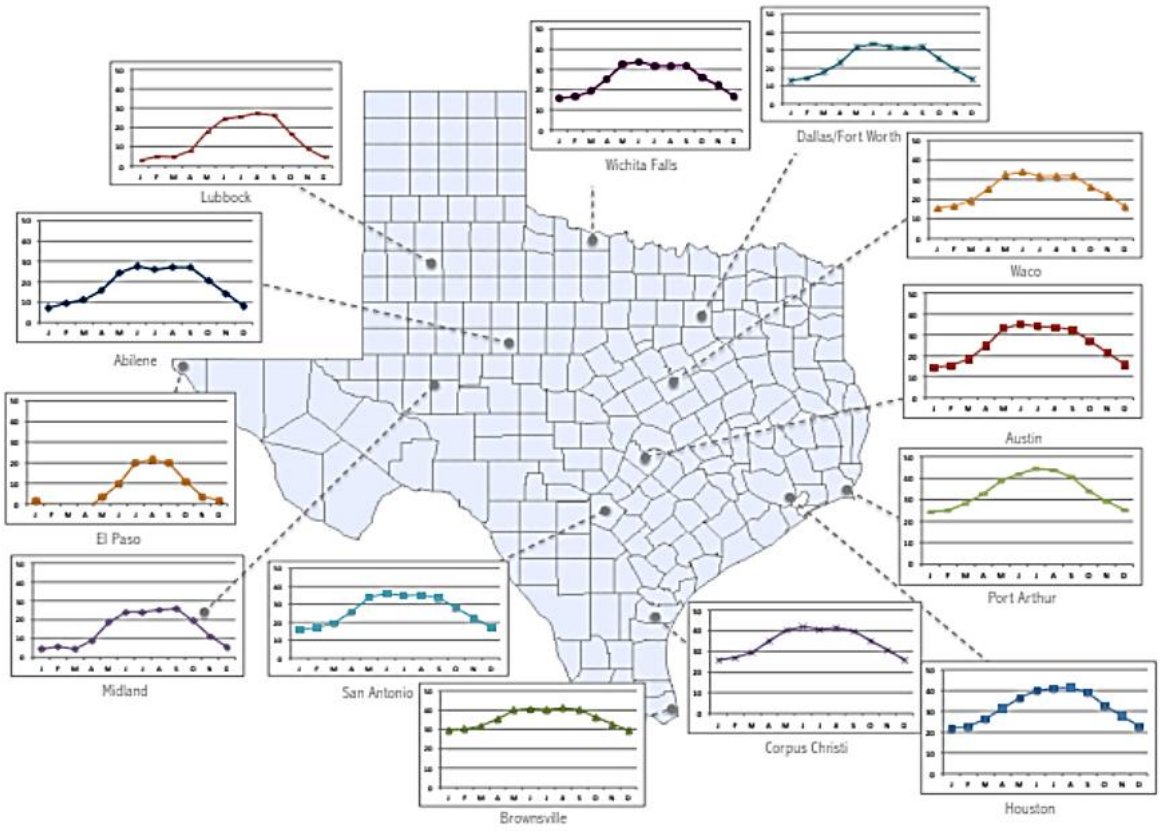
Texas has a diverse climate, ranging from very humid and warm in Southeast Texas to cooler and arid in West Texas. The viability of AWG greatly depends on the climate, and it may not be a realistic technology for large-scale industrial water generation everywhere (see figure on following page). However, it may be an important water resource in rapidly growing regions such as San Antonio, Austin, and the Hill Country.

These South-Central Texas communities often face drought despite regularly having moderate to high humidity (for example, Austin's average relative humidity is 67%, a realistic operating condition for an AWG in the summer).[43] Furthermore, these regions are in need of a diversified water portfolio, as growth is predicted to outpace groundwater and surface water supplies—for example, a Hill Country Alliance report found that all regional water planning studies for the area anticipated a shortage.[44]

[43] World Weather & Climate Information. (n.d.). *Weather & Climate: Average humidity in Austin (TX).* Retrieved February 4, 2026, from https://weather-and-climate.com/average-monthly-Humidity-perc,Austin,United-States-of-America

[44] Hill Country Alliance. (2008, September). *A Look at the Texas Hill Country: Following the path we are on today through 2030.* https://hillcountryalliance.org/uploads/HCA/GrowthScenario2.pdf

AWG5000 Water Production Estimate by Month in Major Texas Cities



Estimations are based on the performance of the AWG5000 in a San Antonio trial, along with 30-year relative humidity and temperature data from each city. Graphs plots are of Hourly Water Production (Gallons/Hour) from 0 to 50 by units of 10 against Months of the Year (January to December). Graphic from a report by the Moses West Foundation in coordination with the Texas Energy Institute (UTSA).[45]

Potential Uses of AWG

Atmospheric water generation is a promising technology to both assist communities struggling with water scarcity and to reduce overuse of traditional water sources such as aquifers and reservoirs. It also has untapped potential for use in a variety of innovative applications.

Data centers

Atmospheric water generation may emerge as an important tool to reduce data centers' reliance on local water supplies by providing an on-site water source. Data centers put serious strain on water supply, reducing how much is available for municipal and agricultural needs.

[45] Adeoye, O. O., Shepard, L. E., Wright, M. (n.d.). Atmospheric Water Generation: A Path to Net-Zero. *AWG Contracting.* https://awgcontractingus.com/wp-content/uploads/2024/08/AWG-A-Path-to-Net-Zero-FINAL.pdf

Water usage varies by the design of the data center, but a large data center using evaporative cooling can evaporate away, or consume, up to 5 million gallons per day for cooling, equivalent to the water use of a town of 10,000 to 50,000 people.[46]

With new data centers slated to be built in already water-strained communities, companies are beginning to be pressured to design data centers that are more water-efficient, such as with closed-loop cooling systems that do not require an evaporation tower.[47] For example, Microsoft's upcoming projects will be designed this way, using no water besides the initial fill during startup.[48] However, currently operating data centers with older systems still use massive quantities of water, and even the initial fill puts a strain on water resources. The amount of water used in the initial fill varies widely depending on the size of the data center, and companies often do not report how much water is initially used.[49]

According to a recent U.S. data center energy report, "the total annual on-site water consumption by U.S. data centers in 2028 could double or even quadruple the 2023 level."[50] There is plenty of room for AWG to alleviate some of the burden that data centers put on local water supplies. For data centers using evaporative cooling, AWG eliminates the issue of mineral build-up on critical infrastructure caused by minerals naturally present in many areas' local water supply since AWG-produced water does not contain dissolved minerals. Some AWG companies are already developing technology with data centers in mind: AirJoule's sorbent-based AWG is designed to use low-grade waste heat from data centers, and the Moses West Foundation reports that their active refrigeration-based units can theoretically be scaled up to data center-level water quantities.[51, 52]

Small-unit applications

Smaller AWG units could be an affordable solution to supply water to areas that are not served by water supply infrastructure. For instance, small solar-powered AWG units could be employed to:

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[46] Yañez-Barnuevo, M. (2025, June 25). Data Centers and Water Consumption. *Environmental and Energy Study Institute.* https://www.eesi.org/articles/view/data-centers-and-water-consumption

[47] Sigalos, M. (2025, September 23). OpenAI's first data center in $500 billion Stargate project is open in Texas, with sites coming in New Mexico and Ohio. *AI Effect.* https://www.cnbc.com/2025/09/23/openai-first-data-center-in-500-billion-stargate-project-up-in-texas.html

[48] Solomon, S. (2024, December 9). Sustainable by design: Next-generation datacenters consume zero water for cooling. *Microsoft.* https://www.microsoft.com/en-us/microsoft-cloud/blog/2024/12/09/sustainable-by-design-next-generation-datacenters-consume-zero-water-for-cooling/

[49] Same as footnote 46.

[50] Li, P., Yang, J., Islam, M. A., Ren, S. (2025). Making AI Less "Thirsty": Uncovering and Addressing the Secret Water Footprint of AI Models. *Communications of the ACM, 68*(7), 54-61. https://doi.org/10.1145/3724499

[51] AirJoule. (n.d.) *AirJoule Technologies.* https://airjouletech.com/technology/

[52] Interview with subject matter expert from Moses West Foundation.

- Service water fountains along hike-and-bike trails in rural areas;
- "Water in" newly planted trees in parks, which require frequent watering to survive in the early stages after planting;
- Provide a source of drinking water for those living in RVs or other "off-grid" environments; or
- Be used as on-demand misting devices at bus stops or other public spaces to mitigate heat island effects[53]

With some imagination, there are many potential applications of AWG technology that could be realized to provide water in places where it is currently unavailable or difficult to access.

Potential Industry Applications

There are many large-scale industries in San Antonio and along the I-35 corridor that use the Edwards Aquifer for water. Many industries in Austin rely on the Colorado River, primarily drawing from Lake Travis and Lake Buchanan. As of October 2025, 92% of Bexar County was in extreme drought, and a large portion of Comal, Hays, and Travis counties are all experiencing severe drought.[54] Drought conditions are prevalent in many regions across Texas, and some industries add to the pressures placed on strained local water supplies. AWG has the potential to be an important supplemental water resource to reduce these industries' reliance on groundwater and surface water supply in the Central Texas region and beyond.

Semiconductor Plants

Semiconductor manufacturing is extremely water-intensive, with plants requiring millions of gallons daily to thoroughly rinse impurities from silicon wafer chips as well as use for cooling systems. Chip rinsing requires ultrapure water, which is water that is completely free of ions, dissolved minerals, or other contaminants. It takes roughly 1,400 to 1,600 gallons of tap water to make 1,000 gallons of ultrapure water.[55] However, water generated by condensing atmospheric humidity is naturally free of many of the minerals and other impurities found in municipal tap water. In the AWG process, air is filtered to remove dust, pollen, and other pollutants before the water vapor is condensed, creating water that is nearly distilled and requires much less filtration to become ultrapure.

The Samsung Austin Semiconductor LLC in Northeast Austin, as of 2021, purchases around 2.2 billion gallons (6,750 acre-feet) from Austin Water yearly (approximately 6.3 million daily) and

[53] Alamo Group Sierra Club. (2026). *San Antonio Heat Challenge.* [PDF]. Personal Communication.
[54] National Integrated Drought Information System. (n.d.). *Drought Conditions for Bexar County.* Retrieved October 2025, from https://www.drought.gov/states/texas/county/bexar
[55] World Economic Forum. (2024, July 19). *The water challenge for semiconductor manufacturing: What needs to be done?* https://www.weforum.org/stories/2024/07/the-water-challenge-for-semiconductor-manufacturing-and-big-tech-what-needs-to-be-done/

reports recycling 960 million of those gallons. The plant also reports needing 2-4 million gallons of ultrapure water daily. Samsung is already using atmospheric water generation at this plant, reporting that when outside humidity is high, "we capture the moisture in the air and use that water onsite."[56]

Another semiconductor plant in San Antonio consistently ranks in the top three highest consumers of SAWS water: Tower Semiconductor, which used around 200 million gallons of potable, nonrecycled SAWS water in the first six months of 2023.[57] Though some other industrial manufacturers in San Antonio, such as a Toyota plant and a Microsoft data center,[58] rely on SAWS's recycled water program for the bulk of their water usage, the chip manufacturing component of semiconductor plants makes this less feasible. However, Tower Semiconductor does have great potential to reduce their water usage by employing atmospheric water generation, especially during the summer when heat and humidity are high and when water conservation is especially critical due to increased demand.

Healthcare Services

Healthcare services require water for the same uses as homes (such as showering and laundering), as well as for many other specialized needs. Uses such as equipment sterilization and dialysis machines require water that is much purer than what comes out of the tap to prevent mineral buildup on equipment and ensure water is completely free of contaminants that could be harmful to patients.[59] Beginning with water produced by AWG would reduce the need to intensely filter municipal supply water, lowering water usage overall.

Methodist Healthcare in San Antonio (one location in a chain of hospitals that makes up the largest healthcare system in South Texas) is consistently one of SAWS's largest customers, using 133 million to 195 million gallons per year. University Health in San Antonio has similarly high water usage and reports using "almost 20,000 gallons of water per day just to meet the needs of its dialysis patients at facilities around the city."[60] However, AWG would bypass the need to filter municipal water, providing an on-site source of clinical-grade water. According to Arizona

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[56] Samsung. (2023, March 21). *Samsung Austin Semiconductor facilities director talks water sustainability efforts.* https://semiconductor.samsung.com/sas/local-news/samsung-austin-semiconductor-facilities-director-talks-water-sustainability-efforts/

[57] Teitz, L. (2023, August 12). San Antonio's biggest water users: Factories, hospitals, theme parks top the list. *San Antonio Express News.* https://www.expressnews.com/news/article/saws-highest-commercial-water-users-18290352.php

[58] Same as above

[59] Steris Healthcare. (2024, March 15). *The Importance of Water Quality in Medical Device Processing.* https://www.steris.com/healthcare/knowledge-center/sterile-processing/water-quality-medical-device-processing

[60] Carnett, L. (2022, August 29). They use millions of gallons of water per month, but these SAWS customers are also conserving. *San Antonio Report.* https://sanantonioreport.org/saws-millions-gallons-water-month-customers-conserving/

State University, the greatest economic opportunities for large-scale adoption of AWG "lie in ultra-pure water" production.[61]

Lithium Refinery

In Robstown, Texas, 20 miles outside of Corpus Christi, Tesla recently constructed a lithium refinery, which began operation in late 2024. As of October 2025, this region is in a historically severe drought, with Lake Corpus Christi below 12% capacity—a serious situation for the small towns that depend on it for water supply.[62] Tesla's refinery forecasted its water use at "as much as 8 million gallons a day," according to a report given by a Tesla employee to a consulting firm.[63] For Robstown, which uses about 1.1 million gallons a day for its 3,804 households (assuming the EPA's estimate of 300 gallons on average for a household's daily use), this estimate would put Tesla's daily water consumption at eight times the average daily residential consumption.

In an area where residents already contend with low water pressure and cloudy tap water, the refinery is raising serious concerns.[64] In a muggy coastal area such as Robstown, where most of the year is warm and humidity is often over 80%,[65] AWG would be able to operate efficiently. AWG could be used as a crucial supplemental water source for refinery operations or for South Texas residents facing a serious, unsustainable drain on their already strained water supply.

Other industries such as the Tesla Gigafactory in Austin, bitcoin mining facilities, healthcare facilities, and technology manufacturing plants could make use of AWG to offset industrial water use. According to the Texas Water Development Board, manufacturing comprised 7% of total statewide water use.[66] Though this is a smaller category than agricultural or municipal water use, the nature of industrial water use, which concentrates large quantities of water use at manufacturing facilities, makes it a good choice for incorporating AWG into operations (as opposed to adding an AWG in every household to reduce municipal water use, for example).

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[61] Rojas-Burke, J. (2025, March 17). Mapping the way to harvesting water from air. *ASU News.* https://news.asu.edu/20250317-environment-and-sustainability-mapping-way-harvesting-water-air

[62] Gibson, M. (2025, October 21). Lake Corpus Christi is drying up and small towns are feeling it. *3News.* https://www.kiiitv.com/article/news/local/lake-corpus-christi-is-drying-up-small-towns-feeling-it/503-732dd5ce-03ba-44bf-8557-c7048ab7d0d2

[63] Carlson, K. (2025, January 7). Musk's Massive Tesla Lithium Plant Hunts for Water in Drought-Hit Texas. *Insurance Journal.* https://www.insurancejournal.com/news/southcentral/2025/01/07/807193.htm

[64] Same as above.

[65] Weather Spark. (n.d.). *Climate and Average Weather Year Round in Robstown.* Retrieved February 4, 2026, from https://weatherspark.com/y/7969/Average-Weather-in-Robstown-Texas-United-States-Year-Round

[66] Texas Water Development Board. (2024, January 11). *Texas Water Use Estimates Summary for 2021.* https://www.twdb.texas.gov/waterplanning/waterusesurvey/dashboard/2021%20Texas%20Water%20Use%20Estimates%20Summary.pdf

Conclusion

According to Arizona State University, which hosted a gathering of AWG experts in 2026 at the second International Atmospheric Water Harvesting Summit, AWG is "poised to revolutionize water access."[67] Innovations in AWG are rapidly improving efficiency and reducing costs, such as through desiccant-based technology that uses metal-organic frameworks and vapor compression designs that use waste heat. ASU also reported that "the cost of atmospheric water harvesting is less than $1 per gallon," and with continued advancements, "costs could drop at least 50 times lower in the near future."[68] AWG also notably eliminates the extensive piping and distribution infrastructure that traditional water sources rely on, reducing costs by generating water on-site right where it is needed.

When considering water sources, AWG is not often in the front of people's minds. But AWG, despite its relative obscurity, is not new—it is a well-established yet rapidly advancing technology ready for commercial applications. As previously mentioned, many companies, communities, homes, and institutions have already adopted AWG. There are many AWG companies already in operation, and the market is expanding rapidly. The global market for AWG is estimated to be worth $2.7 billion as of 2024 and expected to grow to $6.8 billion by 2035.[69]

For AWG to become more mainstream, increased private investment and public incentives such as tax abatements are needed to increase supply and lower cost. Investment in research is also needed to further improve AWG's energy efficiency, increase renewable energy incorporation, and integrate AWG into areas where it is underutilized. As heat and humidity rise and precipitation becomes more variable, [70] Texas will need innovative solutions to prevent water shortages and water crises. Central Texas is an ideal location to increase adoption of AWG technology due to both its climate and its need to reduce reliance on typical water sources. Atmospheric water generation cannot solve every water crisis, but it has the potential to be a critically important water resource, especially when used innovatively.

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[67] Rojas-Burke, J. (2025, March 17). Mapping the way to harvesting water from air. *ASU News.* https://news.asu.edu/20250317-environment-and-sustainability-mapping-way-harvesting-water-air

[68] Same as above.

[69] Spherical Insights. (2025, July). *Top 50 Companies in Atmospheric Water Generator Market in the World in 2025.* https://www.sphericalinsights.com/blogs/top-50-companies-in-atmospheric-water-generator-market-in-the-world-in-2025-market-research-report-2024-2035

[70] Yale Environment 360. (2024, March 22). *In Texas, the Heat Index Is Rising Faster Than the Temperature.* https://e360.yale.edu/digest/heat-index-climate-change