



# Genesis Systems® Aqua-GEN™ Atmospheric Water Generation Systems

*Creating Water at the Edge™*

1,000 to 100,000 gallons/day



- Infrastructure: Portable
- Energy Source: Agnostic
- Consumables: None
- Water: Point of Need

100,000 to 1,000,000 gallons/day



- Infrastructure: Fixed
- Energy Source: Agnostic
- Consumables: None
- Water: Point of need

Genesis was created to **scale up**



8" column  
5,000 g/d



25,000 g/d



100,000 g/d



1,000,000+ g/d

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## EXECUTIVE SUMMARY

Genesis Systems® LLC was founded in 2016 with the purpose of creating a sustainable, affordable, and efficient solution to the global water crisis. Today, over 1.8 billion people worldwide are living in water scarcity and this number continues to increase. It is estimated that between 2030 and 2040, half of the global population may face absolute water scarcity.

The need for water is just as great in the armed forces and the wider Department of Defense (DOD), where sustainment costs for water and fuel routinely exceed 30% of the gross Operations & Maintenance budget. Water is an absolute imperative to any human endeavor. The need for water is pervasive throughout the military, from food production and hydration to medical services and mission support (such as adding water to aviation assets or vehicles). According to the U.S. Army War College, “the Army is precipitously close to mission failure” as it pertains to water (2019). Indeed, in some locations the DOD routinely pays in excess of \$5.00 per gallon for drinkable water. Between 2007 and 2008 in Iraq and Afghanistan, one coalition member was killed or wounded for every 100 water resupply convoys. This translated to the loss of 68 lives in just one year. Going forward, these scenarios are avoidable with low-cost combat ready water generation technology from Genesis Systems® LLC.

Genesis does not generate water by cooling air to the dew point or by absorbing and desorbing metal organic frameworks or silica desiccants, as such methods are outmoded. For instance, almost all water generation systems worldwide fail to deliver promised water production (greater than 300 gallons per day) because they rely on circa 1904 technology (air conditioning). The use of legacy technologies is untenable, given the energy requirements required to chill approximately 500,000 cubic feet of air per hour to make 5,000 gallons of water per day.

With this foundational understanding, Genesis Systems® has developed and created a new method of extracting water from the atmosphere. Genesis Systems’® patented process is called *Hyper Water Phasing™* which is accomplished inside a water generation system called Aqua-GEN™. The Aqua-GEN™ water generation is available in portable and fixed site configurations and can produce between 1,000 and 10 million gallons of water per day from the air in arid conditions as dry as 18% Relative Humidity (RH) and temperatures ranging from 40°F to 120°F. **No other atmospheric water generation system on Earth can produce mass water at the point of need – period.** Genesis Systems’® Aqua-GEN™ produces water using conventional, green, or waste energy. While making water, the system produces no harmful bi-products and at greater than 90% savings to DOD and commercial customers over current water costs in arid, water stressed, or contested environments.

## THE CHALLENGE TO FRESH WATER SUPPLIES

The U.S. military footprint extends to more than 500 installations worldwide. This includes Forward Operating Bases (FOBs) in Afghanistan and Iraq without water production, treatment, or sanitation to large domestic bases that function as established municipalities. Regardless of size or location, the FOBs and U.S. sites require large volumes of fresh water (called mass water) to meet mission requirements. Today, the U.S. military relies on costly desalination plants and reverse osmosis units to purify contaminated saline water or must have bottled water delivered by vehicle or aviation assets. Legacy water technologies and methods are insufficient to meet the increased demands of the modern warfighter in increasingly water constrained environments, particularly where there is no access to water that can be desalinated or purified. In addition, legacy local distribution networks are subject to disruption or sabotage.

For 200 years, the military has managed water systems and has supplied water to some of the most austere and unforgiving environments in the world. However, over time these existing methods have grown costly, cumbersome, and in many cases dangerous. Today, the budgetary burden of water and fuel is more than 30% of the total DOD O&M budget. During conversations with a U.S. Navy senior leader at the Joint Chiefs of Staff, the leader expressed concern that the last time one of his aviation transport ships was in port, the cost of water exceeded the cost of aviation fuel.

Given the requirements for mass water, the need to reduce logistics burdens, provide persistent resources, and agile and emerging mission requirements – through its partnerships with Genesis Systems® the DOD is helping propel paradigm changing innovation in the water infrastructure sector. Genesis Systems’® technology also has multiple use cases within the commercial sector. From individual water consumption to water service in buildings to industrial and agricultural uses, Genesis’ scalable technology has the potential to save time, money, and lives, while increasing



resilience and reach around the world (see graphic below). In summary, Genesis Systems® patented **Hyper Water Phasing™** is the only scalable, turn-key, green technology that provides an elegant solution to meet increasingly challenging force sustainment water demands.

## PROVEN TECHNOLOGY

**Genesis Systems® Technology:** Genesis Systems'® stand-alone high-output Air-to-Water Generation system uses an novel process called **Hyper Water Phasing™** which requires no water source and provides water generation at an energy efficiency 70- 80% higher than any other known or validated technology. While legacy water absorption technologies refrigerate incoming air using cooling coils to chill air to the dewpoint or regenerate solid desiccants, Genesis Systems® patented process employs a carefully managed thermal dynamic process and multi-stage liquid absorber to capture fresh water – even at high air temperatures and low humidity levels. **Hyper Water Phasing™** may also use low-value energy or renewables, allowing the system to generate water for costs as low as a \$0.0025 per gallon. The graphic below provides an overview of the theory of operations.

### Hyper-Water Phasing™ Process



Genesis Systems® focuses on producing water at a competitive cost in demanding, contaminated, or otherwise water-scarce environments. Genesis' patent-pending technologies benefit and answer the U.S. military, allied, and commercial and government technological challenges by:

1. **Generating water directly from the air** — at industrial/agricultural scale (1,000 to 10 million gallons per day)
2. **Operable in the world's most arid regions** — as low as 18% relative humidity (most of earth)
3. **Power: plug-in or self-contained** — may utilize clean energy sources and uninterruptable power systems
4. **Portable systems offered in either 40' or two 20' containerized units** — capable of being transported via truck, rail, or aircraft
5. **Customizable** — systems may be hardened to electro-magnetic pulse (EMP) pulse, CBRNE, and cyber threats
6. **Scalable** — Genesis Systems® community (fixed site) plants can scale to over 10 million gallons per day
7. **Low Maintenance** — Genesis' Aqua-GEN™ is remote controllable, requires low maintenance, and lasts 20-25 years

**Scientific Validation.** Genesis Systems® technology represents the culmination of more than 40 years of Research & Development and is ready for implementation in combat environments world-wide. The company has tested and demonstrated in Roebuck, SC, San Antonio, TX, and Tampa, FL. System validation has been provided by third party engineers and scientists from the nation's largest laboratories. The system has been operated in an array of challenging temperature and humidity combinations and delivers reliable water production, 24 hours a day. In addition, Genesis has received a Phase I SBIR and SBIR II and is able to provide units to DOD customers under sole source contracts. We are a government research partner.

In addition to signed DOD MOUs and ongoing stress testing and system enhancements, Genesis recently completed preliminary site survey and analysis for a fixed site pilot project for a large organization near Dallas/Fort Worth. Further,



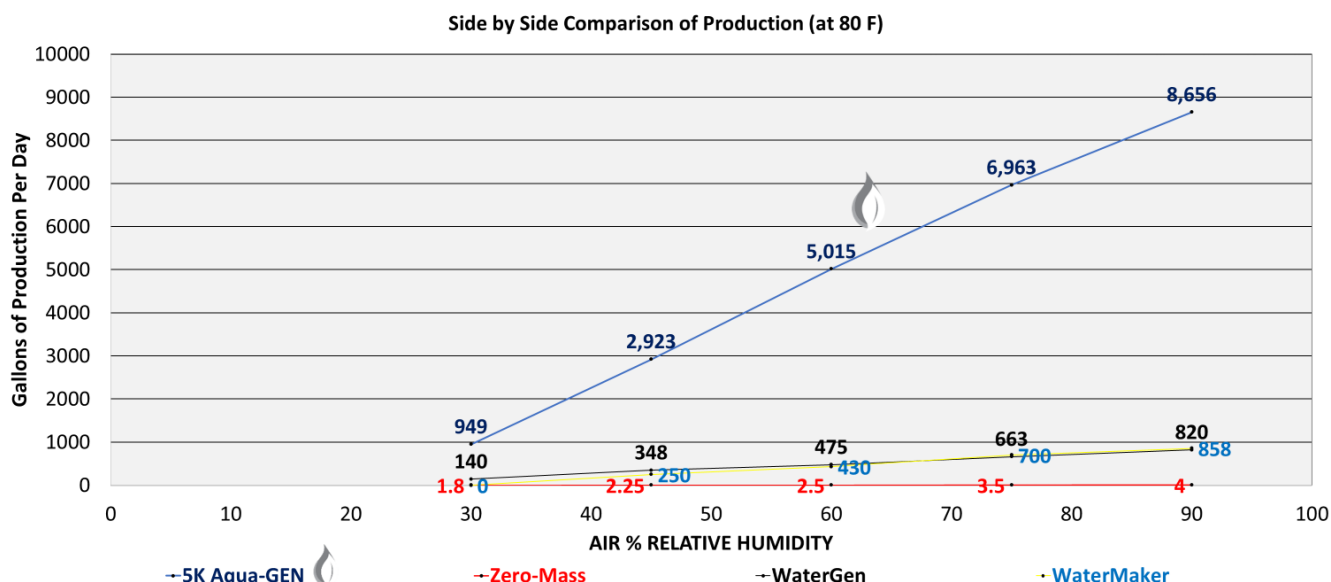
interest has been expressed by USINDOPACOM, USCENTCOM, USEUCOM, Australian Ministry of Defense, and NATO. DOD partners are working to rapidly implement Genesis' technology into 2021-2022 allied exercises, many of which are delayed due to COVID-19.

**Enabling Technologies:** Genesis Systems® patented technology primarily utilizes proven and durable technologies re-applied in a novel way to accomplish mass water production from the atmosphere. A key feature of the tech is its ability to operate continuously and efficiently. Presently, the company is exploring system adaptation in cold and arctic conditions with government partners. The Aqua-GEN™ system is designed to be powered with low-value, green technologies but is also easily adaptable to conventional grid or generator power sources.

The system can be transported easily via ground, rail, or air. Systems were created with strong consideration as to size, weight, power, and energy efficiency. Presently no other system on earth can produce mass water and offer advantages such as producing medical grade water, geothermal power adaptations, CBRNE or electromagnetic pulse hardening, ability to connect to municipal and legacy water distribution infrastructure, and continuous monitoring of CBRNE elements and system contaminates. At Genesis Systems®, mass water is our core competency. Our systems were built with the warfighter and harsh environments in mind, with demanding standards required by life-support systems technologies.

**Alternative Technical Approaches:** The Genesis Systems® team has a combined depth of experience that spans more than 550 years of expertise in DOD business, science, engineering, sales and marketing, strategic research, intelligence, strategy, branding, emergency management, conservation, agriculture, biosciences, and global programs and initiatives. Members of the global executive team include America's premier business, finance, engineering, military, and government leaders.

Additionally, Genesis has secured partnerships with a robust and capable group of defense, information technology, academic, and private sector. Competition (below) does not stack up next to Genesis' superior technology, performance, and water production. From an efficiency standpoint alone, Genesis Systems® technology is 70- 80% more efficient than any other known validated atmospheric water generation technology. Using this unique technology, water production is superior by orders of magnitude all with a reduced footprint, cost, and maintenance.



**Tech Maturation:** Genesis Systems'® core technology is rated at a TRL level 10, with other features such a CBRNE filtration at an TRL 3-5. Genesis' working prototype and production model uses demonstrated and proven technologies and can be implemented and adapted within months. We are currently exploring opportunities to provide on-site demonstrations and taking orders for purchase of portable water units. Genesis has identified and prepared production



agreements with three manufacturers and is prepared to build over 75 portable units a year with an un-interruptible US based supply chain.

**Time to Fielded Solution.** If the military should choose to implement Genesis' fixed site systems at bases, the company can build and field units that produce up to 10 million gallons a day in less than 8 months. Production time to build portable units is as little as 60 days and up to 90 days, volume dependent.

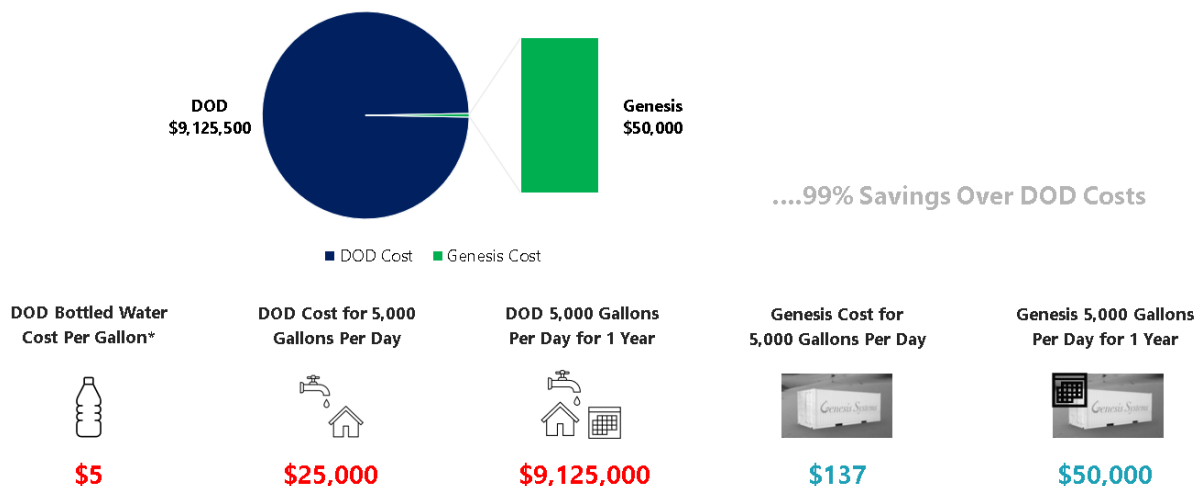
## POTENTIAL IMPACT

**Problem Being Solved:** Genesis Systems® technology solves the issue of “Hydration in a Contested Environment” as outlined by the Army War College in 2019. The company can provide water at the point of need, where and when needed in almost all areas of the globe. The Army War College anticipated that solving this problem would take between 6 and 10 years. However, Genesis can meet demanding needs right now - with a capacity to provide solutions for any scenario including austere locations such as islands and deserts. The *Hyper Water Phasing™* technology also applies to civilian water needs and emergency and disaster support and can be infinitely scaled.

**Sector of Focus:** Genesis Systems® technology has significant commercial market pull in the following areas: agriculture, energy, manufacturing, consumer products, and emergency water applications (such as emergency water generators), and medical and public health. Using an interdisciplinary engineering approach that combines the best of breed concepts from civil, aerospace, nanomaterials, thermodynamics, and other often siloed disciplines, Genesis has achieved a technological breakthrough once only theoretical.

**Solution's Uniqueness:** Genesis Systems® technology is the only technology of its kind that can create mass water over such a large portion of the globe, with no burdensome infrastructure requirements, no standing or underground water sources, and at a savings of greater than 90% over current DOD costs. Such savings are equally strong in civil and commercial segments.

### Cost Comparison: Genesis vs. Current DOD Bottled Water



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\*Figures are based on Aqua-GEN system performance of 5,000 gal/day output at 365 days production in optimum temperature and humidity settings. Military cost data from: Joint Forces Staff College – “The U.S. Military’s Reliance on Bottled Water During Military Operations,” by Lt. Colonel James S. Moore, (17 June 2011)

**Operational Impact:** The estimated water market in the DOD is over \$8 Billion per year. Per the Army War College, “Without technology advances, water remains 30-40% of the force sustainment [cost] requirement.” During operations in Iraq, soldiers used approximately one million bottles of water per month. Genesis offers the ability for the DOD to sustainably produce water at the point of need without a requirement for access to standing or underground water sources and without need for constant resupply. **The water production of one 5,000 gallon per day portable system can save an equivalent of 230 C-17 sorties when stacked end-to-end with pallets of bottled water.**





**Impact Scale Potential:** The potential scale of the positive impact Genesis Systems® can have on the U.S. military is nearly incalculable. In addition to supplying deployed and FOB locations, Genesis provides an ability to scale up to production levels sufficient to supply water to US-Allied stationary bases both CONUS and OCONUS. According to the GAO, nearly 102 U.S. bases are facing water scarcity (2019). Genesis can potentially supply reliable freshwater throughout the military at prices as low as \$.0025 per gallon.

This provides not only cost savings, but also resiliency and independence from civilian or foreign government sources. Finally, this resilience reduces the vulnerability of troops and logistics outside the wire. The graphic below illustrates Genesis' military market verticals and operational areas.

### I. Deployable Water Systems



### II. Community Water Systems



- Mass water solutions at savings up to 99.5%\*
- Largest operating range of any known water generation tech
- Patented in 6 countries and EU
- 100% U.S. owned company.



Blue indicates operational area based on average humidity and temperature

\*Savings to U.S. Department of Defense per U.S. gallon over present costs (Including fuel)



**Warfighter Demand:** In March 2020, Genesis Systems® showcased its capabilities at the Indo-Pacific Command's (U.S. INDOPACOM) Pacific Operational Science and Technology Conference in Hawaii. Following the event, Genesis received verbal commitments from U.S. Navy, U.S. EUCOM, U.S. CENTCOM, U.S. INDOPACOM, and the Australian military. DOD interest in our technology continues to grow due to our system's unique ability to provide clean, reliable, mass fresh water while saving the military more than 90% over current water costs.

## DUAL USE MARKETABILITY

**Dual Use:** Genesis Systems® technology has compelling use cases in agriculture, energy, tourism, hospitals, emergency response, and municipal water supplies. Genesis estimates the atmospheric water generation (AWG) market to be valued at over \$10 Billion by 2027, with a total global water market valued at over \$1.2 Trillion.

In the commercial sector, Genesis is conducting site and pilot plant assessments with organizations in the Dallas/Fort Worth area. Additionally, the governments of Australia, Gambia, Chile and others have asked Genesis to bring water solutions to their national infrastructures.

In 2020, Genesis advanced to the second round in Pepperdine University's Most Fundable Startup Competition and was selected as one of Kansas City, Missouri's Most Investable Startups. These opportunities and accolades demonstrate the widespread interest and demand for Genesis' technology in both commercial and civil applications. In 2021, Genesis was selected for a Phase II SBIR by the USAF and as a US Army XTech (Genesis Systems has advanced to top 15 of 375 companies under the US Army Futures Command program).

The graphic below illustrates the potential growth of Aqua-GEN™ in just the AWG market alone.



...if Genesis captures 10 percent of the Atmospheric Water (AWG) Market



**Future Civilian-Sourced R&D Funding:** To date, interests in Genesis Systems® has resulted in multiple successful rounds of private investment. In addition, Phase I and II SBIR awards from the Air Force, private consulting services, and prizes have surpassed hundreds of thousands. Genesis is poised to bring innovation, resiliency, and cost savings to the DOD and industry now. The company is actively seeking opportunities and partnerships to rapidly bring our cutting-edge tech to the warfighter.

## Momentum

Busines	Product/Tech	Market
 Partner w/US' Largest Infrastructure Builder	 4 prototypes	 awards: DoD SBIR, xTech 2020/2021, KC's Most Investable Pepperdine U Most Fundable USAF Challenge 2021
 global team	 10 patents; pending; trade secrets	 706 addressable markets
 zero debt	 >90,000 hrs engineering	 21 nations pulling

## Partners/Allies





## Contacts and Government Contract Information

Genesis Systems® LLC is a woman and veteran owned small business. For more information contact Danielle Ruis at [D.Ruis@GenesisSystems.Global](mailto:D.Ruis@GenesisSystems.Global) or visit [www.genesisissystems.global](http://www.genesisissystems.global).

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### Government Contract Information:

Duns: 080961989  
Cage Code: 8CBEO

### Member:



### Product Videos:

Link 1: [100 Second Video of Genesis Systems® Technology](#)

Link 2: [Welcome to Genesis – The Future of Water](#)



Ex Nihilo: From Nothing – Life™

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