SOCIÉTÉ DE L'EAU AÉRIENNE SUISSE

WHITE PAPER

ENHANCING GREENHOUSE PRODUCTIVITY & SUSTAINABILITY

WITH SEAS SYSTEMS

EXECUTIVE SUMMARY

Greenhouse operations face mounting challenges from water scarcity, rising operational costs, fungus caused by excess humidity and the need for sustainable resource management. Traditional cooling systems rely heavily on external water sources that are increasingly expensive and environmentally unsustainable, particularly in arid regions where many greenhouse facilities are located.

SEAS Air-to-Water Generator (AWG) technology presents an innovative solution by producing high-purity water on-site from atmospheric humidity while simultaneously enhancing dehumidification and cooling efficiency. This white paper presents findings from comprehensive research across 18 different operational configurations in a 4,400 m^3 commercial facility, demonstrating how SEAS AWG systems can transform greenhouse operations, delivering measurable improvements in both productivity and profitability.

THE CHALLENGE: Water Dependency & Rising Operational Costs

Water Scarcity Impact on Greenhouse Operations

Modern greenhouse facilities require substantial water resources for cooling, irrigation, and climate control, while also reducing fungus-generating excess humidity. Fan pad cooling systems, while effective, consume significant quantities of water and depend entirely on external supplies, requiring 40-50 complete air changes per hour to maintain optimal growing conditions.

Key operational challenges include:

- Increasing water costs and supply volatility
- Dependence on municipal or well water sources
- Environmental impact of traditional water sourcing
- Operational vulnerability during water shortages

Limitations of Traditional Sytems

Traditional cooling systems operate independently of other facility needs, creating missed opportunities for resource optimization. Conventional approaches often result in suboptimal temperature and humidity control, high energy consumption relative to cooling output, and limited operational flexibility during peak demand periods.

THE SOLUTION: SEAS AWG Integration

Revolutionary Air-to-Water Technology

SEAS AWG systems extract moisture directly from ambient air, transforming it into high-purity water while providing simultaneous cooling benefits. This dual-function approach creates significant operational synergies for greenhouse facilities.

Advantages Over Traditional Water Sources

CAPABILITY	TRADITIONAL SYSTEMS	SEAS ATW SYSTEMS
Water Source	External Dependency	On-Site Generation
Cooling Efficiency	Single Function	Dual cooling + water production
Operational Independence	Vulnerable to supply distruptions	Autonomous Operation
Water Quality	Variable: Requires Treatment	Consistently high purity
Environmental Impact	Resource Depletion	Sustainable Extration

Operational Synergies

SEAS AWG integration creates a beneficial cycle where the greenhouse's-controlled humidity environment enhances water production efficiency, while the AWG system contributes additional cooling capacity. This symbiotic relationship maximizes ROI through optimized resource utilization.

PRODUCTIVITY & PRODUCTION GAINS

Enhanced Performance

Research conducted by SEAS senior engineering staff demonstrated significant operational benefits:

Water Production, Energy Efficiency & Humidity Reduction

- Higher water production compared to standalone outdoor operation
- More energy efficient than a conventional outdoor operation
- Temperature reductions
- Humidity reductions

Immediate Financial Benefits

- Water cost elimination through reduced or elimination of external water purchases
- Enhanced energy efficiency delivering lower operational expenses
- Quality improvements with higher-purity water supporting better crop yields
- Reduction of humidity combats crop-destroying fungus, which can decrease production by 15% or more

Operational Resilience

AWG integration provides greenhouse operators with operational independence from external water sources and proven year-round reliability in challenging conditions, crucial for maintaining consistent production schedules and protecting crop investments.

SUSTAINBILITY & FUTURE OUTLOOK

AWG technology supports sustainable water use and reduces the environmental footprint of greenhouse operations. As climate change increases the frequency of water-related disruptions, on-site water generation becomes increasingly valuable for agricultural asset owners.

The integration of AWG systems with greenhouse facilities exemplifies circular resource use, where renewable energy can power the production of critical inputs for maintaining agricultural infrastructure.

CONCLUSION

SEAS AWG technology provides a reliable, sustainable, and high-quality source of water for greenhouse operations while delivering simultaneous cooling and dehumidification benefits. By enabling optimal climate control and reducing dependence on traditional water sources, AWG systems can increase both the productivity and resilience of greenhouse facilities.

The result is higher operational efficiency, lower operational risks, and a more sustainable approach to commercial greenhouse deployment.