Lowering Energy Costs in Electronics Manufacturing with Adiabatic Humidification

Maximizing Efficiency and Process Reliability Through Humidity Control

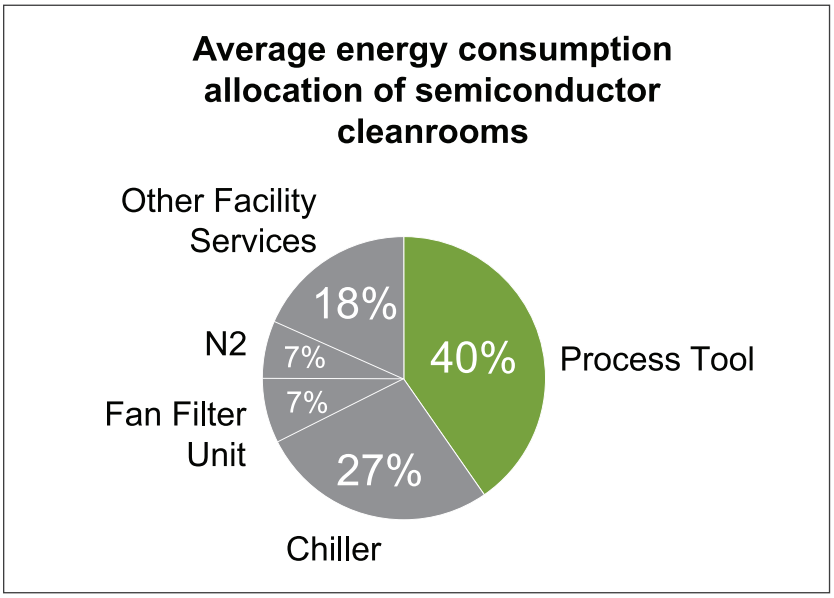
driSteem™

THE CHALLENGE: ENERGY-INTENSIVE ENVIRONMENTS AND HUMIDITY-SENSITIVE PROCESSES

In electronics manufacturing, environmental control isn't optional, it's essential. From surface-mount technology (SMT) lines to cleanrooms and storage zones, maintaining precise relative humidity (RH) is critical to preventing electrostatic discharge (ESD), minimizing moisture-related defects, and ensuring long-term product reliability.

However, achieving this level of control often comes at a significant energy cost. At the same time, electronics facilities typically run powerful HVAC systems year-round to manage internal heat loads from equipment, lighting, and personnel.

As energy prices climb and decarbonization goals become standard in procurement requirements, manufacturers are under growing pressure to reduce energy usage without compromising process integrity. Fortunately, adiabatic humidification offers a way to meet both objectives, improving environmental control while significantly lowering operating costs.



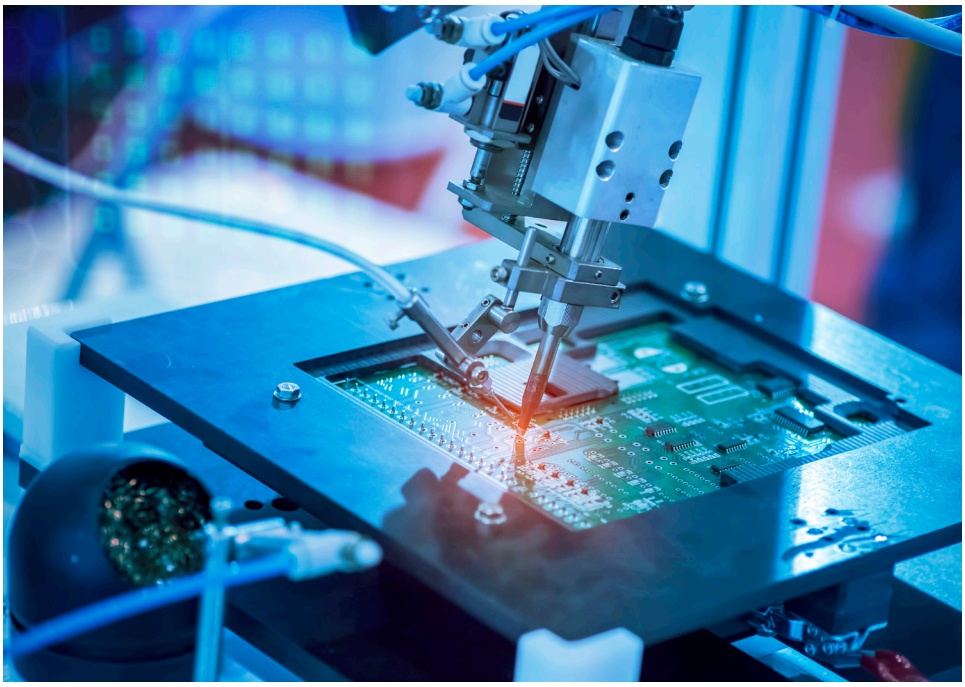
Chillers can consume up to 27% of the total energy used in a semiconductor cleanroom, making them one of the largest energy draws in a facility.

THE SOLUTION: ADIABATIC HUMIDIFICATION THAT PAYS YOU BACK

Adiabatic humidification systems work by introducing water into the air in a fine mist, allowing it to evaporate naturally and absorb heat from the surrounding air. This process simultaneously adds humidity and lowers the air temperature, reducing the load on other cooling equipment.

For electronics manufacturers, this means they can maintain optimal RH levels while leveraging the cooling effect to offset their mechanical cooling demand. The result is a dramatic reduction in utility bills across two fronts: humidification and cooling.

Adiabatic systems don't just perform a single function, they do double duty, delivering the moisture your processes need while helping your building stay energy-efficient and cost-effective.



> **Reduce chiller load and energy costs by leveraging the ambient air's thermal energy for cooling.**

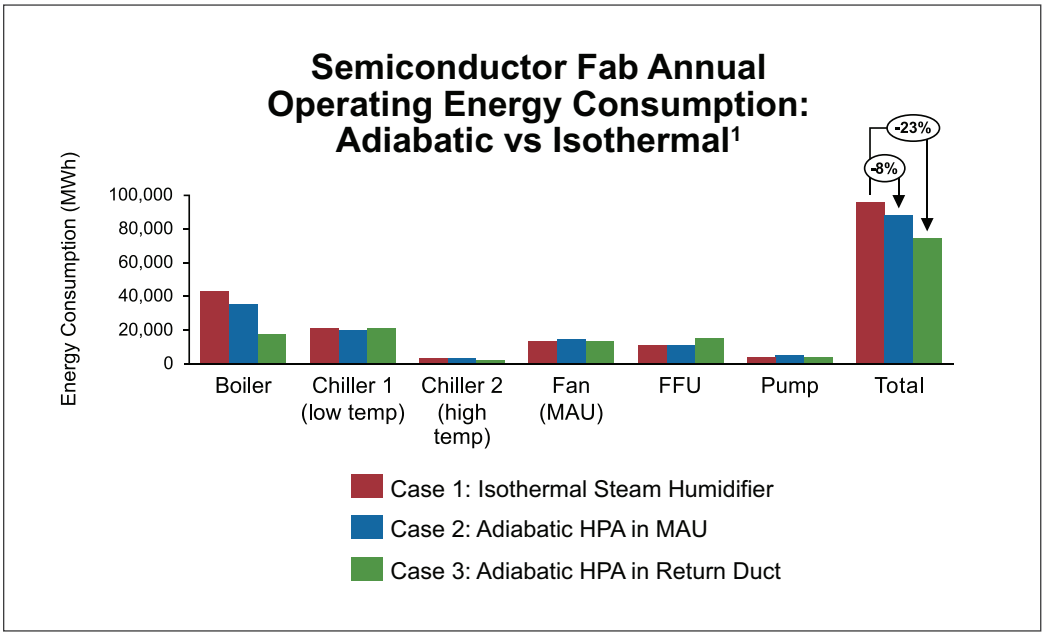
ENERGY AND COST IMPACT: REAL-WORLD EXAMPLES

Across the electronics sector, manufacturers who adopt adiabatic humidification systems report substantial savings, both in energy use and operating costs. A facility switching from an isothermal system (such as gas or electric steam) to a high-pressure adiabatic system may reduce its humidification energy use by 30–70%, depending on the climate and operating hours. But that's only half the picture.

Because evaporating water absorbs heat, these systems also lighten the load on chillers, often cutting HVAC energy use by another 10–25%. This dual savings effect results in payback periods as short as 6–12 months. Even in colder climates, internal heat gains from equipment make these systems viable year-round, delivering consistent savings regardless of outdoor conditions.

Typical benefits include:

- 30–70% reduction in humidification energy costs
- Cooling energy savings of 10–25%, depending on outside air strategy
- Payback in less than one year, especially in buildings with extended cooling seasons



1: Jo M-S, Shin J-H, Kim W-J, Jeong J-W. Energy-Saving Benefits of Adiabatic Humidification in the Air Conditioning Systems of Semiconductor Cleanrooms. Energies. 2017; 10(11):1774. https://doi.org/10.3390/en10111774

KEY BENEFITS FOR ELECTRONICS MANUFACTURERS

Electronics environments are highly sensitive to changes in temperature and humidity, and adiabatic systems meet these demands while reducing utility expenses. They offer a comprehensive range of benefits that impact both your bottom line and your operational performance.

Adiabatic humidification systems offer:

1. Energy Savings and Operational Cost Reduction

Adiabatic systems consume significantly less energy than other cooling systems because they rely on natural evaporation. As water absorbs heat from the air to evaporate, the surrounding air cools, reducing the load on chillers and air conditioners.

- Uses the building's own heat to evaporate water
- Offsets cooling loads from HVAC systems

Find Incentives in Your Area

Looking to offset the cost of a new humidification system? Many utilities and local governments offer rebates and incentives for energy-efficient HVAC upgrades, including adiabatic humidification. Use the DSIRE database (Database of State Incentives for Renewables & Efficiency) to quickly find available programs by ZIP code.

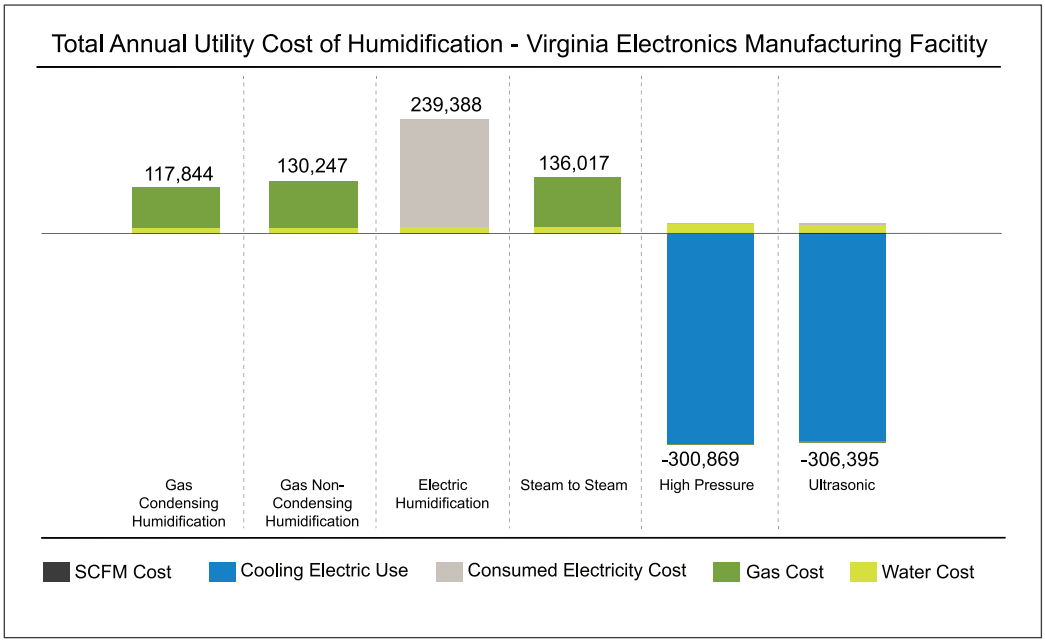
Visit **www.dsireusa.org** to explore energy-saving incentives in your region.

> **Humidity control doesn't have to drain your budget. Adiabatic systems pay you back with every drop.**

HVAC Energy Analysis Tool (H.E.A.T.)

DriSteem's proprietary H.E.A.T. tool makes it easy to compare humidification technologies by evaluating energy use, performance, and long-term costs side by side, helping you identify the most efficient solution for your facility.

The chart below shows how the H.E.A.T. tool compares annual utility costs for various humidification technologies in an electronics manufacturing facility in Virginia.



Request a Custom Analysis

Get a tailored energy audit and see how much you could save with an adiabatic solution.

Contact your local DriSteem rep at:
www.dristeem.com/get-in-touch-with-a-humidity-control-expert

> **Sustainability isn't just good business – it's smart engineering. Adiabatic systems prove that every day.**

2. Improved Process Stability

Precise humidity control is essential to prevent ESD, delamination, and moisture absorption. Adiabatic systems provide responsive, stable humidification across all process areas, from SMT lines to storage zones.

- Maintains RH to prevent ESD and moisture imbalance
- Ensures dimensional stability of PCBs and moisture-sensitive components

3. Sustainability and Compliance

Sustainability is becoming a key decision factor in technology procurement. Adiabatic systems help reduce both electricity and natural gas consumption, contributing to decarbonization goals and often qualifying for energy efficiency incentives.

- Aligns with decarbonization and ESG goals
- Eligible for energy rebates and incentives in many regions

4. Minimal Disruption to Existing Systems

Adiabatic humidification can be added to existing HVAC infrastructure with minimal impact. Whether you're retrofitting or designing a new system, integration is straightforward and scalable.

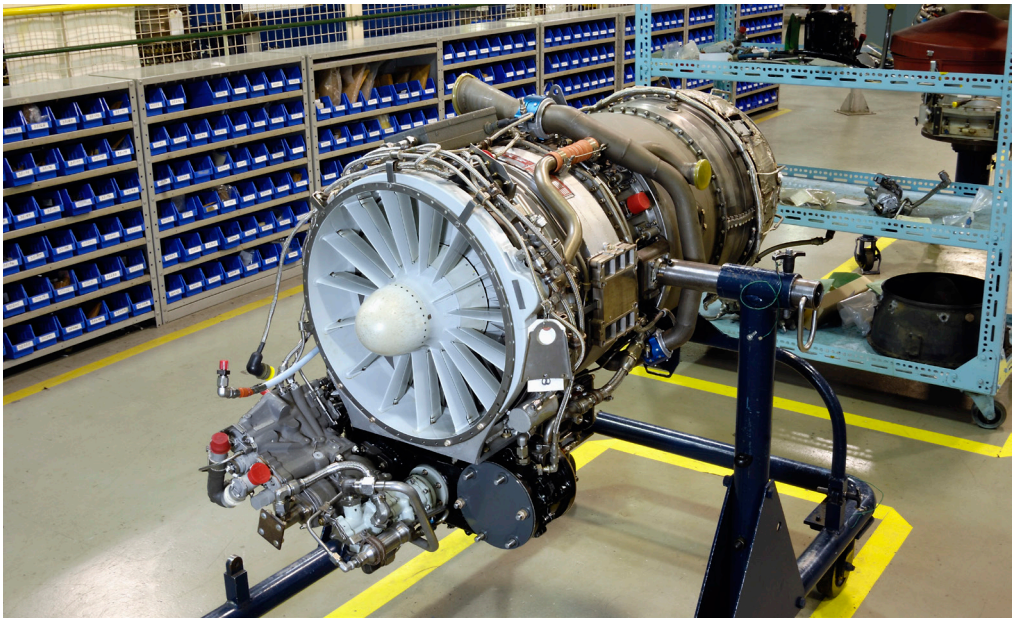
- Integrates easily into the space, existing AHUs, or ductwork
- No need to replace your current HVAC system

FREE COOLING, NO COMPROMISES

Electronics manufacturers often use air-side economizers to capitalize on free cooling from outdoor air. While effective at reducing HVAC energy use, this strategy tends to dry out the air, creating RH conditions that are harmful to equipment and process control.

The result is a win-win:

- Extended use of free cooling into warmer months
- Stable RH without added heating or humidifier energy consumption
- Improved process reliability and indoor air quality



> **When you control humidity efficiently, you control your costs, your risk, and your reputation.**

APPLICATION AREAS IN ELECTRONICS MANUFACTURING

Adiabatic humidification is a versatile solution that serves a wide range of manufacturing and operational spaces within the electronics industry. Its energy-saving performance and RH control make it an ideal fit for both high-tech clean environments and bulk material handling zones.

Ideal application areas include:

- SMT and PCB assembly lines
- Semiconductor fabs and cleanrooms
- Electronics testing and calibration labs
- Data centers co-located with production
- Storage areas for moisture-sensitive components

HVAC Energy Analysis Tool (H.E.A.T.)

Compare humidification technologies by energy use, performance, and cost to find the most efficient solution for your facility with DriSteem's proprietary H.E.A.T. tool.

For a custom analysis, contact your local DriSteem rep at:
www.dristeem.com/get-in-touch-with-a-humidity-control-expert

> **Adiabatic humidification turned our facility's existing heat load into free cooling and stable humidity – for savings we can see.**

IS ADIABATIC HUMIDIFICATION RIGHT FOR YOUR FACILITY?

If your operation requires tight humidity control, experiences high internal heat loads, or is looking for opportunities to cut energy costs and align with sustainability goals, then adiabatic humidification should be on your radar.

You should consider adiabatic humidification if:

- Your facility requires precise RH for sensitive electronics
- You operate cooling systems most of the year due to internal loads
- You want to reduce operating costs or qualify for energy rebates
- You are pursuing LEED, ESG, or decarbonization targets

With short payback periods and long-term energy savings, adiabatic systems offer one of the smartest upgrades an electronics manufacturer can make.

Adiabatic humidification systems from DriSteem include the Adiatec® High-Pressure Atomization System and Ultrasonic Humidifier

TALK TO AN EXPERT

DriSteem's Adiatec® adiabatic systems deliver precise humidity control with minimal energy use, making them ideal for electronics manufacturing, cleanrooms, and other sensitive environments. These systems are designed to meet the demanding requirements of modern facilities, offering flexible installation options whether you're retrofitting an existing AHU or specifying equipment for a new build.

Every Adiatec® solution is engineered for performance, efficiency, and reliability, with added benefits like ASHRAE 170 compliance, reduced operating costs, and support for your facility's sustainability goals.

Ready to See the Impact?

Our team can run a detailed HVAC energy analysis to compare humidification technologies and show you how much your facility could save with Adiatec®, and how quickly your investment can pay off.

Request Your Custom Energy Analysis

Get in touch with your local DriSteem representative:
www.dristeem.com/get-in-touch-with-a-humidity-control-expert

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Continuous product improvement is a policy of DriSteem; therefore, product features and specifications are subject to change without notice.

Expect quality from the industry leader

Since 1965, DriSteem has been leading the industry with creative and reliable humidification solutions. Our focus on ease of ownership is evident in the construction of DriSteem products. DriSteem leads the industry with a Two-year Limited Warranty and optional extended warranty.

For more information:
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For the most recent product information visit our website:
www.dristeem.com