

WHITE PAPER

EVAPORATIVE HUMIDIFICATION AND COOLING FOR ALL CLIMATES

WHY HUMIDIFY – AND WHY CONSIDER EVAPORATIVE TECHNOLOGY?

Facility managers, owners and operators humidify their buildings for many reasons – the most common being the health of the people in the building and to protect equipment or products from dry air. Of course, humidification has a cost to operate. Evaporative humidification and cooling, regardless of the climate, can be the most cost-effective way to keep your building healthy, comfortable, and profitable.

WHAT IS EVAPORATIVE HUMIDIFICATION AND COOLING?

Humidification is simply adding water to the air of a building – for health, comfort, preservation, or process. One common way to humidify is to boil water and add the steam to the air, which is known as steam humidification. In comparison, evaporative humidification draws water into the air through the natural effect of evaporation (hence the name). Hanging laundry to dry and using hair dryers are common examples of this. Evaporation also causes the air to cool down, like the cool breeze off a lake or the cooler air near a waterfall.



Minnehaha Falls in Minneapolis, Minnesota

The primary methods for evaporative humidification and cooling are High Pressure nozzles and Wetted Media Systems. High Pressure simply uses a pump to pressurize clean water and push it through small nozzles to atomize the water into the air handler or space. Wetted Media Systems distribute water over a pad in the air handler, and the airflow over the wetted media causes evaporation. Other options include ultrasonic and pressurized air systems.

WHY CHOOSE EVAPORATIVE HUMIDIFICATION AND COOLING?

As discussed above, humidification is important for your commercial or industrial building. Whether you need to protect your employees, or your manufacturing line needs to operate at peak efficiency, choosing the correct humidification for your application can make order-of-magnitude differences in your annual utility costs. And this is true from the deserts of California through the frigid winters in Minneapolis.

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ENERGY CONSIDERATIONS – WHY EVAPORATIVE HUMIDIFICATION

Steam humidification takes energy from electricity or gas as a power source and uses it to make steam. That steam is then added to the air for humidification. This means that every pound of water that enters the air has an easy-to-define cost associated with it. Evaporative humidification and cooling removes energy out of the air to evaporate the water, which can mean reduced cooling costs. Since the energy is in the air, the cost per pound of water that enters the air can even be considered a “negative cost” because the cooling is beneficial to the building.

Evaporative cooling and humidification can make a massive dent in a building’s utility bills. On top of this, many utilities and governments allow energy rebates for switching over to evaporative humidification and cooling. More governments are implementing energy regulations, and there are more benefits everyday to managing energy usage per square. The free cooling and low-energy use of these evaporative humidification and cooling systems can be a win-win-win for quality, for comfort and for operational costs. Payback on switching to evaporative humidification and cooling can often be realized in less than one year.

ENERGY CONSIDERATIONS – DOLLARS AND CENTS

For this example, average American utility cost information was used. The building is a general manufacturing facility in Minneapolis and has reasonable setpoints, including night-time setback. The building uses an airside economizer and minimizes outside air when it is not beneficial to the building. The chart shows the estimated total annual humidification cost for the building. The numbers are rounded for easy viewing.

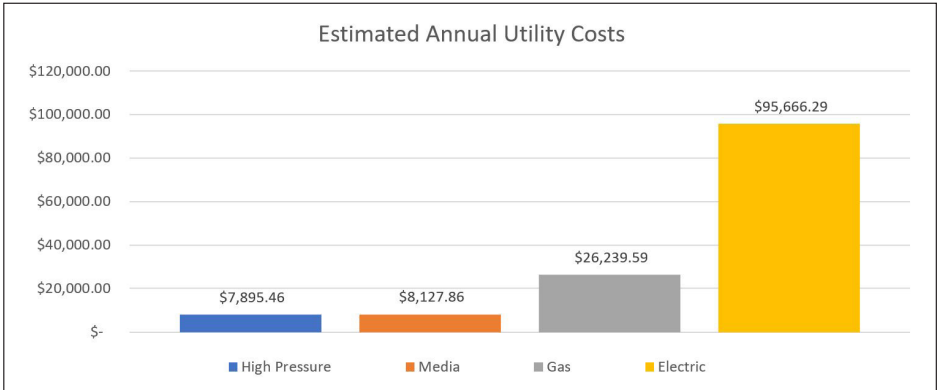
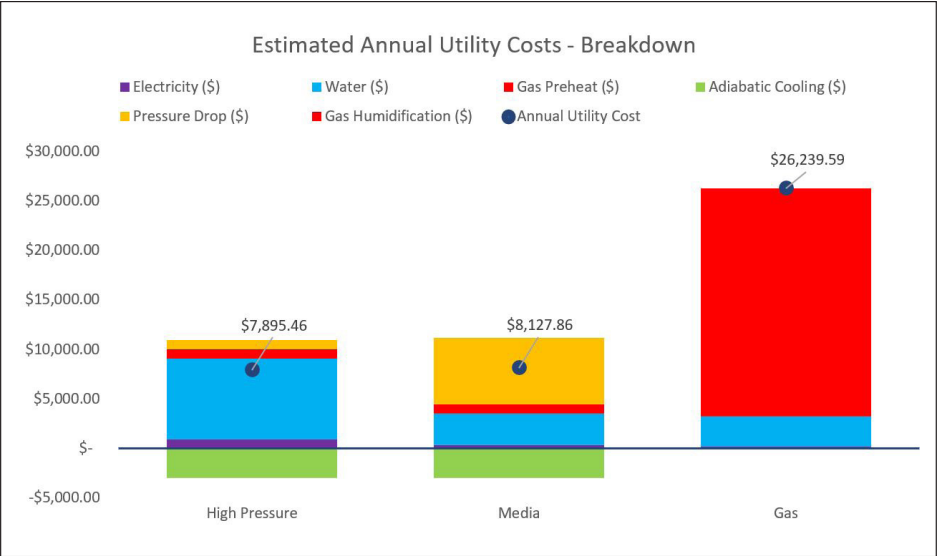


Table 1 - Annual Utility Costs for Humidification of a Manufacturing Facility in Minneapolis

It is interesting to look at how this costing breaks down; where are the savings made, and where do the extra dollars go? The below chart breaks these out in more detail. Only beneficial evaporative cooling is considered as a “negative cost” – a savings. Cooled air that needs to be reheated is considered a cost to the humidifier.



Contact your local DriSteem representative to learn more – and to learn what rebates might apply to your building.

WHERE CAN THIS BE APPLIED?

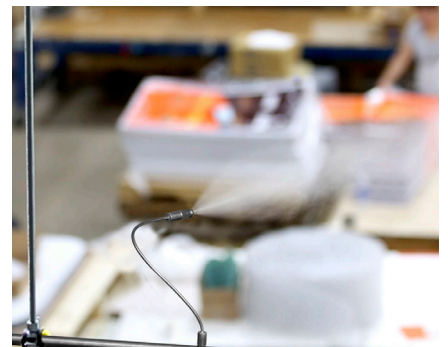
There is an assumption that the above energy savings can only be seen in hot desert climates – certainly not in the frigid north! But this is not correct. Evaporative Cooling and Humidification can be applied in every climate – given the right applications.

These “right” applications are common and varied. The most obvious would be a data center; they have a year-round cooling load and they need to be above a certain relative humidity. These buildings could be in Phoenix, Edmonton, New York or Minnesota and evaporative humidification and cooling should be a consideration. Of course, appropriate applications do not have to be this specialized.

Large office buildings and malls often have internal cooling loads late into the winter, based on lighting, equipment, and people. As a definitive example, the Mall of America in Bloomington, Minnesota, does not even have a central heating system! In an office building, using that extra heat for evaporative humidification allows for free humidification which benefits the health and comfort of all occupants.

Woodworking and printing facilities often must humidify to optimize their process and products, and in most situations the evaporative cooling effect can allow for free humidification as well as savings on cooling. Many manufacturing facilities – such as electronics, pharmaceuticals, and metal working – can benefit equally from a high-pressure or wetted media system.

If your building actively cools late into the season, evaporative humidification and cooling should be your next upgrade.



FREE COOLING

Evaporative cooling systems integrate well with existing mechanical systems and offer reduced cooling and humidification costs. Installing an evaporative humidification and cooling system can help reduce the operating costs of a building without complicating the existing controls or making changes to your existing mechanicals.

While every building is a candidate for an evaporative system, those with a high cooling demand are the easiest to justify. If a building's cooling system is operating late into the autumn, and early in the spring, then adding an evaporative system may be the most cost-effective change that can be made. This applies whether the building uses mechanical cooling, air-side economizing or water-side economizing. Evaporative cooling can reduce the cooling bill by reducing demand on mechanical cooling equipment – and effectively eliminate the humidification bill.

Using an air-side economizer, while remarkably effective for reducing cooling bills, dries out the building. In fact, the driest time for air-side economizer buildings is often in the autumn and spring. A dry building increases the risk of disease among employees, aggravates allergies, decreases the quality of many materials, and may cause disruption to manufacturing processes. Using an evaporative humidification and cooling system can extend the economizer season further into the summer, eliminate humidification costs, reduce mechanical cooling costs and can even reduce the amount of frost coil usage in the winter by reducing the amount of outdoor air needed to cool.

Evaporative humidification and cooling is a win-win-win for buildings with an extended cooling season – regardless of the climate. Talk to your DriSteem representative to learn more.

HUMIDIFICATION REVIEW

Evaporative humidification and cooling should be considered in every climate. Your building needs an expert – your local [DriSteem representative](#) will work with you to recommend the best humidification system for your specific needs, whether it is evaporative or steam.

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