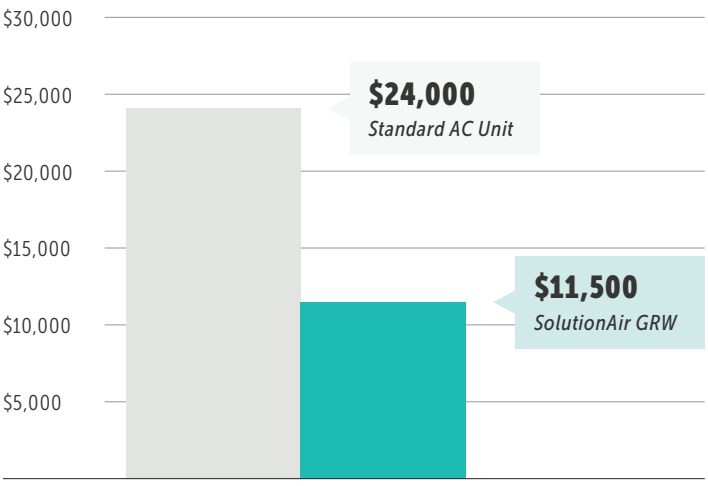
ENERGY EFFICIENT OPERATION

Challenge

With continuous operation and control, the energy consumption for environmental control can amount to 25% or more of the revenue of an indoor horticulture operation.

The continuous operation of an indoor horticultural environment (IHE) results in peak loads occurring hours a day every day. This is in stark contrast to comfort cooling applications where peak demands may be only hours per year. Energy efficiency has a far more significant impact on operating costs in a grow operation than it would in most other applications.

Annual Energy Cost to Dehumidify 125 Gallons/Day



Solution

The GRW is designed to control humidity and temperature independently and to automatically operate at the most efficient process point.

Dehumidification Process

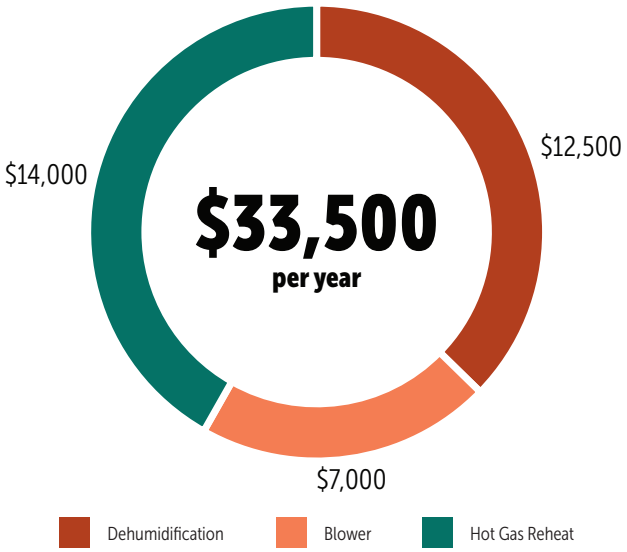
Assuming a grow facility is maintained at 75 °F (25 °C) and 50% relative humidity, the GRW unit is capable of providing over 200% of the dehumidification capacity per cooling ton when compared to a standard comfort cooler operating at 400 CFM/ton (189 L/s per ton). This level of dehumidification is 30% higher capacity per ton of cooling than even an enhanced cooling dehumidifier running at 300 CFM/ton (142 L/s per ton).

Assuming a system with an Energy Efficiency Rating (EER) of 10, and electricity costs of $0.10 kWh, the annual costs of dehumidifying 125 gallons (473 L) per day – the approximate requirements of 1,000 plants at 16 oz (473 mL) per day – would be over $24,000 for the standard conditioning and almost $15,000 for an enhanced dehumidifier. The GRW would provide this level of dehumidification for $11,500 with a savings of as much as $12,500.

Cooling Efficiency

The GRW unit is designed to be efficient. Typical AC systems of this size may have a cooling EER (not including blower energy) of 10, and enhanced dehumidifiers may be around 9.5. The GRW is designed to operate at an EER of 11. That's 10-15% more efficient in performing the sensible cooling (temperature cooling) process in addition to having a latent cooling (dehumidification) process that is at least 30% more efficient.

Potential Annual Energy Cost Savings of a 10,000 CFM GRW



Reduced Blower Energy

In addition to the reduced normal airflow, the GRW is designed with variable airflow control. The result is that the unit will be moving as little as 50% compared to standard conditioning unit airflows, reducing blower horsepower significantly. At $0.10/kWh the BHP has an annual cost of $1,000. Although difficult to forecast accurately, alternative units to the GRW with the same dehumidification capacity at 10,000 CFM (4,720 L/s) and without a variable blower control, could use on average as much as 5 to 7 more BHP to provide their greater airflow. The SolutionAir GRW would provide a cost savings of as much as $7,000 per year or more in comparison.

Hot Gas Reheat

Hot gas reheat (HGRH) is a tremendously efficient method of reclaiming energy to provide free reheat to the space. It is an important part of dehumidifying without over-cooling. Growers can suffer with lower than expected space temperatures, and are then forced to use standard heating devices like electric heat to make up the temperature difference.

GRW is designed with 20 to 30 degrees Fahrenheit of extra HGRH capacity, far more than typical HGRH systems. The unit is capable of discharging air at a temperature 25 °F (14 °C) warmer than the temperature in the space. This gives the grower two options: keep the space warmer when desired at no energy cost, or eliminate expensive additional heat. The value of this reheat can add up either in the productivity of the operation, or in energy reduction. Assuming a 10,000 CFM (4,720 L/s) unit using 10 °F (5.5 °C) of extra reheat to replace electric heat for 12 hours of the day at $0.10 kWh would result in nearly $14,000 per year in savings.