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5 SUSTAINABLE WAYS TO INCREASE GREENHOUSE EFFICIENCY AND CUT COSTS

Greenhouses are one of the most energy-intensive sectors of the agricultural industry. Sustaining year-round crop production in a new-era glasshouse requires the exhaustion of natural resources like natural gas, electricity, and water[1].

To increase the profitability of production, growers need to place a greater emphasis on sustainability and use more energy-efficient, environmentally-friendly means of growing.

[1] "Sustainable greenhouse systems," Sustainable Agriculture: Technology, Planning and Management, January 2010, https://www.researchgate.net/publication/285928780_Sustainable_greenhouse_systems.

FIVE STRATEGIES FOR EFFICIENT RESOURCE MANAGEMENT

Optimize the use of your greenhouse resources for greater efficiency and to reduce production costs.

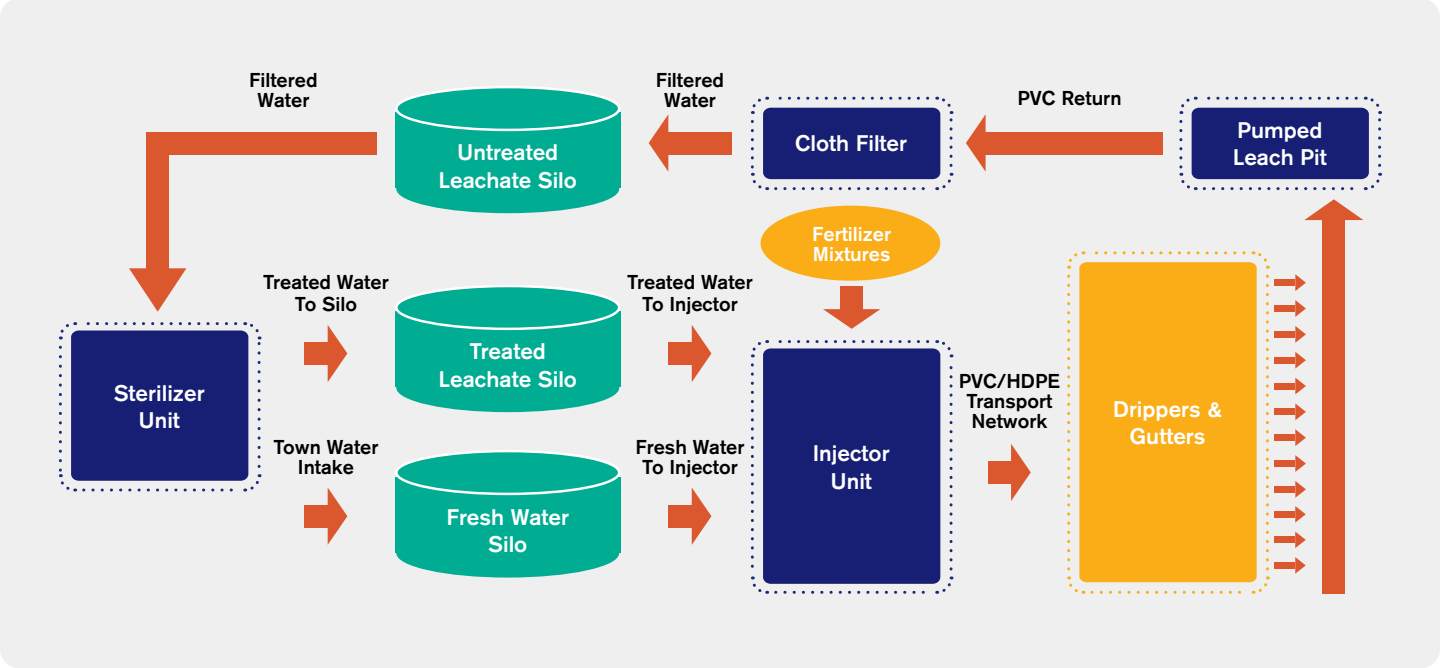
01 INSTALL A RAINWATER MANAGEMENT AND RECIRCULATION SYSTEM

A typical greenhouse facility can consume up to 10 L/m^2, or 40,000 liters of water per day for a single acre. With a large amount of water flowing through the range on a daily basis, it would be beneficial for growers to take a closer look at reducing water usage and addressing water availability constraints.

Installing a proper rainwater management and recirculation system can supplement your municipal water supply for the irrigation of your present—and future—crops. Rainwater can be collected from the range roof, directed to a retention pond, filtered and sterilized, and then stored in a tank that can be used to supplement fresh water.

With the rising prices of fertilizer, many growers have resorted to using a leachate collection system. The leachate collected is typically pumped back, filtered, sterilized, and reused as a fertilizer base for the next fertigation cycle.

Agtech vendors who are experienced in greenhouse growing understand how to make the most of renewable resources. Prospiant takes water conservation to the next level with an end-to-end, customizable rainwater recirculation system. By leveraging both leachate collection for fertigation and rainwater recirculation, growers can save up to 50% of fertilized and fresh water to supplement greenhouse production.



02 SAVE THERMAL ENERGY WITH A WATER BUFFER TANK

Greenhouse growers need a cost-efficient strategy to maximize heat and energy, especially during colder climate seasons when heat is lost to the surrounding atmosphere. In fact, estimates show that more than 80% of energy used by greenhouses goes into heating during the winter[2]. Maintaining uniform temperatures during cold snaps is especially important for the healthy growth and development of greenhouse crops, but with rising energy costs, this can quickly get expensive.

Greenhouse operations that use boiler systems to produce and distribute CO_2 during the day can benefit from the addition of a well-insulated water-buffer tank. The buffer tank stores thermal energy, in the form of hot water generated by the boilers during daytime CO_2 distribution. During high temperature hours, when the sun is at its highest, plants demand CO_2 to photosynthesize and stay productive. The addition of a hot water storage tank allows growers to run their natural gas boilers during the day to produce CO_2 and store the hot water by-product for nighttime use when demand for heat in the range is required.

Storage tanks also give growers the flexibility to run their boilers in non-peak hours when gas is less expensive because they can store water for use later when they have a heat demand. This approach not only saves energy and money but also reduces the need for natural gas to power the boilers.

[2] "Putting the "Green" into Greenhouses", Scientific American, February 12, 2009, https://www.scientificamerican.com/article/putting-the-green-into-greenhouses/

03 REDUCE BOILER USE WITH A CO2 COLLECTION SYSTEM

Since the 1970s, the growth of the greenhouse industry has dramatically increased the need for supplementary CO_2[3]. Carbon dioxide is an essential part of the photosynthesis process and vital for plant growth. This leaves growers with a new dilemma—how do you consistently supplement CO_2 to crops without exhausting your boilers and driving up operating costs?

With years of experience in sustainable greenhouse growing, Prospiant designs every greenhouse with a fully-equipped CO_2 collecting system. We customize our CO_2 collectors and attach them to the natural gas boilers that heat your range.

Even when you have multiple boilers, you only need to run one to produce CO_2. Our CO_2 collectors act as a manifold in which several CO_2 fans can pull from simultaneously and distribute CO_2 to your greenhouse crops to increase growth rates and prevent excess CO_2 from being released into the atmosphere. In seasons when your range has low heating requirements, the supplementary CO_2 can help you save on natural and operating gas without needing to run all your boilers.

[3] "Greenhouse Carbon Dioxide Supplementation", Oklahoma State University, March 2017, https://www.iwapublishing.com/news/reverse-osmosis-and-removal-minerals-drinking-water

04 CONSERVE ENERGY WITH A CURTAIN SYSTEM

In winter months, your greenhouse loses a substantial amount of heat through the roof, which leads to increased energy costs. There are curtain options that provide a high level of light transmission and even light diffusion while maintaining a steady climate in your greenhouse.

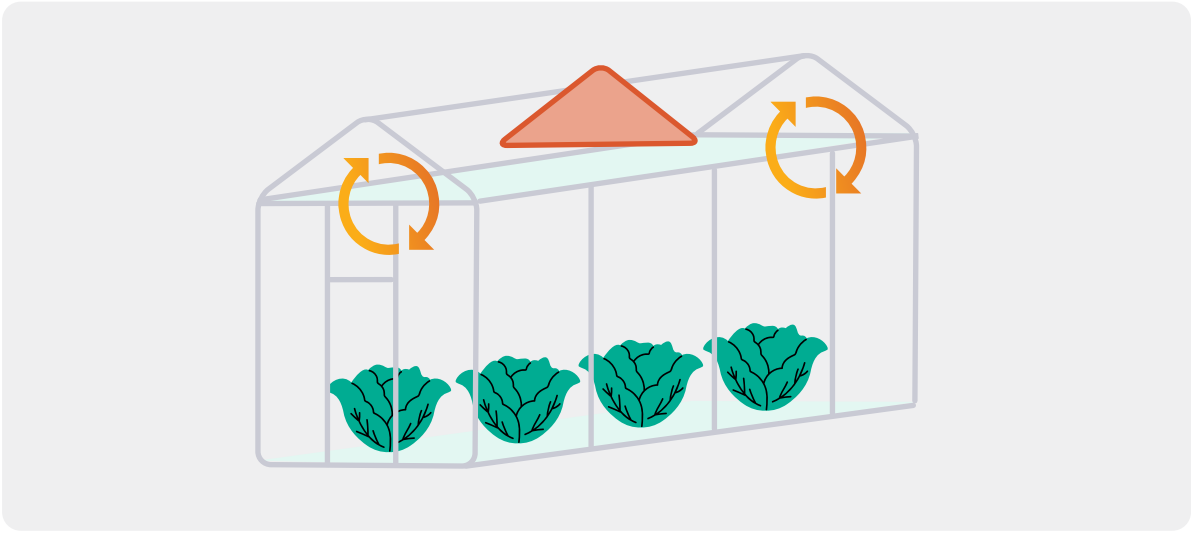
The various types and capabilities of greenhouse curtain systems are adaptable to different crops and climates. For example, a horizontal screen designed for energy efficiency can offer up to 89% of light transmittance while providing 47% in energy savings. On the other hand, a horizontal screen focused on shade can provide up to 52% shading while providing as little as 15% energy savings or as much as 47% energy savings. Shade curtains can also be equipped with diffused properties to scatter sunlight more effectively, and they're designed to allow for ventilation. They are also designed to still allow for ventilation (venting reductions to as little as 30% when the screen is fully closed).

With the right curtains system, you can gain up to 50% in energy savings and maintain optimal light and heating conditions without the need to run your boilers. Adding multiple curtains or cavity screens can enhance energy savings and shading levels to an even greater degree. But choosing the right curtains for your greenhouse largely depends on the type of crops you grow. Our experts at Prospiant can recommend a solution that will fit the needs of your crop or climate.

05 IMPROVE TEMPERATURE UNIFORMITY WITH AIR BAFFLES

When temperatures above the closed curtain are cooler than the temperatures below it, warm air from beneath the curtain, which is less dense, escapes through the gaps and rises to the highest point in the greenhouse. As the warm air reaches the highest point, it cools and flows towards the edges of the greenhouse. The cooled air then seeps back under the screen and makes its way to the crops. This creates circular air movement that results in a temperature gradient across the greenhouse where some spots are hotter or colder than others. Growers then resort to running their boilers to eliminate cold pockets and balance out the temperatures.

A more sustainable way to save energy and natural gas usage is to install air baffles. These triangular vertical screens are installed in the peaks of the greenhouse to help improve air circulation and minimize temperature variations. Crops benefit from the uniform climate and less energy is consumed because the temperatures fluctuate less.



START SUSTAINABLE GROWING TODAY

The complexity of sustainable greenhouse growing will only continue as we enter a new age of agtech development. But with a team of growing experts by your side, you can confidently navigate this ever-changing journey with success.

Increasing your greenhouse crop yield, producing energy savings, and generating greater production efficiency is a reality with Prospiant. With over 1,000 acres of large-scale produce projects built, our team of experts is ready to guide you through every aspect of your journey to sustainable growing.

Get connected with one of our growing experts today and learn how to make sustainable greenhouse growing, a reality.

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