Irrigating smarter

New technology allows nurseries to water more efficiently while saving energy

In greenhouses, fine-tuned irrigation and improved system controls help growers deliver the right amount of water at the right time, supporting plant health while reducing energy use. In 2026, Energy Trust of Oregon is expanding incentives for greenhouse upgrades, including high-performance materials and efficient heating strategies to help make these improvements more accessible. PHOTO COURTESY OF ENERGY TRUST OF OREGON

BY MITCH LIES

With energy and labor costs at or near record highs, it has never been more important for nurseries to strive for efficiency. And with suppliers, researchers and cost-share programs working to address this need, multiple opportunities are available to do so.

Scott Brault of **Ernst Irrigation** in St. Paul, Oregon, said several of his suppliers have introduced advancements in irrigation technology in recent years that have helped growers improve irrigation efficiency, conserve water and reduce energy costs — and more are on the way.

"They all have their place," Brault said. "It is all about that remote management, remote monitoring, less checking on fields and keeping the labor doing other things and not working overtime. I'm seeing a lot of systems go from all hand-operating valves to electric control valves, where growers are only irrigating when they need to."

The first big key to irrigation efficiency, according to sources, is utilizing soil moisture sensors to help determine when and how much to irrigate. According to Irrometer, a leading supplier of soil moisture sensors, monitors provide visibility into the root zone by measuring the percentage of water by volume in a given amount of soil and/or measuring soil water tension, which is the physical force holding water in the soil.

A second key involves proper interpretation of the data, interpretations that can be improved over time by monitoring plant performance under different soil moisture levels and adjusting levels as needed.

"At the end of the year, they can take that data and use that data in the following year, as far as their water management," Brault said.

Many growers are finding irrigation efficiencies by switching to pumps with variable-frequency drives and adopting low-pressure systems, Brault said. The combination has helped some reduce energy costs by 25% or more in some cases, and is contributing to improved plant health.

"You want to keep a plant in that sweet zone of that full moisture profile, where it is getting the oxygen it needs and the nutrients are being taken up and it is not being drowned," Brault said.

Uniformity is key

In many respects, irrigation efficiency comes down to uniformity, said Steve McCoon of **Nelson Irrigation**.

"Efficiency means that the plant is able to beneficially use the water that is applied," he said. "That is a very high goal, and it can't be achieved if the system is not uniform. And so, high uniformity is our goal."

High uniformity in an irrigation systems involves applying the right droplet size at the right pressure and at the right mounting height, a combination that when dialed in enables water to penetrate a plant's canopy, whether that be in a field, container or greenhouse setting.

"If we do this in uniform manner, then we can achieve high efficiency," »

McCoon said.

McCoon noted that Nelson sells several sprinklers that offer high uniformity, including a new multi-streamed model, the MS-10. The MS-10 features multiple trajectories and droplet size variabilities. "The net effect is that the water gets to where it's supposed to be, and that is helping us have higher efficiencies," he said.

"We are just getting better at producing higher uniformities all the time," he said. "We have learned a lot over a lot of years, and it's been exciting to see the growth of that."

Ernst works with multiple suppliers, Brault said, including Nelson, Toro Tempus and AgSense, a remote control and monitoring system from Valley Industries that works well with center pivots and linear systems. All have their places, he said.

"We tailor it to what the farmer needs and what they want," he said.

Cost-share programs

Growers looking to upgrade irrigation systems may be able to mitigate a significant portion of their cost by tapping cost-share programs through the nonprofit **Energy Trust of Oregon**.

Energy Trust offers two general categories of incentives, according to Brad Moore, agriculture program engineer. There are rebates, and there are and calculated incentives that are based on the amount of energy savings a program is expected to deliver.

"We have a team of engineers that help estimate energy savings for a given project," Moore said.

The programs are available for everything, from whole system upgrades to replacements for parts like sprinklers, nozzles and gaskets.

Under the rebate program, growers can apply after purchasing and installing upgrades. "We made this program very simple to where if someone wants to replace nozzles or sprinklers, they can just go ahead and do that and then send in the application after the fact, and they get a check from Energy Trust," Moore said.

The calculated incentives program is available to cover the cost of energy-saving upgrades that aren't eligible for rebates. "It's more like a custom-type incentive, so we calculate the energy savings and then Energy Trust has an amount of incentive it pays per unit of energy saved," Moore said.

Researchers at Oregon State University are building and testing an affordable soil moisture monitoring system that utilizes open-source electronics. PHOTO COURTESY OF OREGON STATE UNIVERSITY

Energy Trust also offers no-cost, on-site support to help identify energy-saving opportunities.

"A lot of times farmers aren't really fully aware of what to bring up with us," said Kegan Craig, a contractor who works with Energy Trust. "So, we go out into the field with them, have them give us a tour of their irrigation system and talk about the project they're thinking of, and we can in real time be gathering information for the engineers to do the calculations but also suggesting things that we either can give incentives for or just good practices that we know of.

"Oftentimes, there are a lot of hidden small components that they can upgrade that they weren't really thinking about," Craig said.

For many projects, such as retrofitting a pump with a variable frequency drive, swapping out sprinklers and gaskets and other common upgrades, Energy Trust incentives can cover about half of the cost, Moore said.

And, he noted in nearly all cases, upgrades help growers save money on their

energy bills and can lead to improved irrigation performance and better plant health.

Research project

Another potential upgrade that growers might want to keep an eye on is being hatched in a research project coming out of Oregon State University. Udayakumar Sekaran, Ph.D., an assistant professor of crop and soil science in Malheur County, is working on an affordable soil moisture monitoring system that uses open-source electronics.

"We are building this unit so that farmers can use this unit to monitor their soil moisture real time and make irrigation decisions," Sekaran said.

The project is a collaboration between Oregon State University and Clemson University, where Sekaran did his postdoctoral research. It is funded in part by the Oregon River Basin Water Initiative Project, a legislative initiative. »

Across nursery fields, technologies like soil moisture sensors, automated valves and efficient pumping systems are helping growers irrigate more precisely and cut energy costs. Energy Trust of Oregon works alongside growers with on-site support and cash incentives to help make these upgrades achievable. PHOTO COURTESY OF ENERGY TRUST OF OREGON

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Growers looking to upgrade irrigation systems may be able to mitigate a significant portion of their cost by tapping cost-share programs through Energy Trust of Oregon. PHOTO COURTESY OF ENERGY TRUST OF OREGON

"There are many commercially available soil moisture units out there, but they are a little costlier than this and they need subscriptions and maintenance," Sekaran said. "This one that we're building is more affordable. And we are generating a manual so that growers can build these units on their own."

The system can operate with Wi-Fi, cellular and also radio signal data if no network is available. It uses watermark sensors to take moisture reading and soil water potential, and a data logger sends the data directly to the cloud, where it can be stored online, Sekaran said.

Farmers will be able to use an app called ThingView to see the readings from individual sensors and see soil moisture potential in real time on a cell phone, Sekaran said.

"They are able to see that and make irrigation decisions," he said. "So, it avoids them going to the field all the time to dig up the soil to see whether it is dry or not. You can download data online and see soil moisture levels throughout the season."

In the system, soil moistures sensors are placed at different depths in the soil and left in place throughout a growing season. The system uses solar panels with batteries as backup energy to gather data and send it to the cloud, he said.

The system also enables growers to measure how their water use is coinciding with soil moisture data, which can help further refine irrigation management decisions.

The units are being designed to be compatible with irrigation automation technology, which is another piece of technology under development by the university.

The system, now two years in development, is probably another two years from being ready for commercial introduction Sekaran said.

With new technology on the horizon, energy-efficient options now on shelves, and with cost-share programs available to help mitigate equipment and installation costs, nursery growers have multiple opportunities to embrace energy efficiency and improve their irrigation systems now and into the future.

And with energy costs rising, the benefits of embracing the technology can be substantial.

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