NEW YORK STATE | Office of Cannabis Management

WATER CIRCULARITY IN CANNABIS

SUPPORTING RESOURCE EFFICIENCY
FOR NEW YORK STATE CANNABIS PRODUCTION

APRIL 8, 2026

OVERVIEW

- Welcome, Introductions and Housekeeping
- Review of OCM water-related regulations
- Drought management for agriculture
  - Tim Sheldon, New York State Department of Agriculture and Markets
- Water reuse and recycling for cannabis production
  - Rob Eddy, Resource Innovation Institute
  - Jared Babik, DRAMM Water
- Additional resources
- Q&A
  - Place questions in the Chat box directed to “All panelists”

CHAT HOUSEKEEPING

- When using Chat function:
  - Please keep questions and comments focused on water use topics
  - Please maintain decorum and respect towards our panelists and each other
- Post-webinar survey
  - Rating and feedback specific to today's webinar
  - Space to request future education topics, other comments
- Other questions for OCM?
  - Sustainability inquiries
    - PowerScore@ocm.ny.gov
  - General inquiries
    - info@ocm.ny.gov
    - 1-888-OCM-5151

OCM WATER REGULATIONS

POWERSCORE REPORTING

- Resource tracking is required for all licensees authorized to cultivate cannabis in NYS
  - Energy, water, waste, emissions
  - PowerScore is specified by OCM as the approved reporting platform
- Reminder!
  - 2025-26 PowerScore annual reporting due **Aug. 31, 2026**
    - All licensees authorized to cultivate who were licensed on or before Dec. 31, 2025
    - Even if not yet operational
  - OCM Sustainability webpage: **cannabis.ny.gov/sustainability**

To access PowerScore, scan QR code or visit **cannabispowerscore.org/new-york**

POWERSCORE RESULTS

- Preliminary data from first year's PowerScore reporting
- 31% of reporting licensees engage in water reuse and recycling:

Reclaimed Water: Sources	Reclaimed Water: Uses
Rainwater Irrigation Condensate/HVAC	Irrigation Pest control Sanitization Post-harvest activities

OCM WATER REGULATIONS

	Adult-use Regulations	Medical Regulations
Water sourcing*	125.2(c)(1)(ii) Nurseries, processors, all licensees authorized to cultivate	113.12(d)(4) All ROs
Water testing*	125.1(e)** Nurseries, all licensees authorized to cultivate	113.15(d) All ROs
Water consumption tracking* (i.e. PowerScore)	123.4(g)(1)(ii) Nurseries, all licensees authorized to cultivate	113.26(a) All ROs

*The Energy & Environmental Plan and PowerScore guidance documents are available on the Office's Sustainability webpage, at http://cannabis.ny.gov/sustainability

**See Table 6 of 10 NYCRR Subpart 5-1 for more information about testing for total coliform.

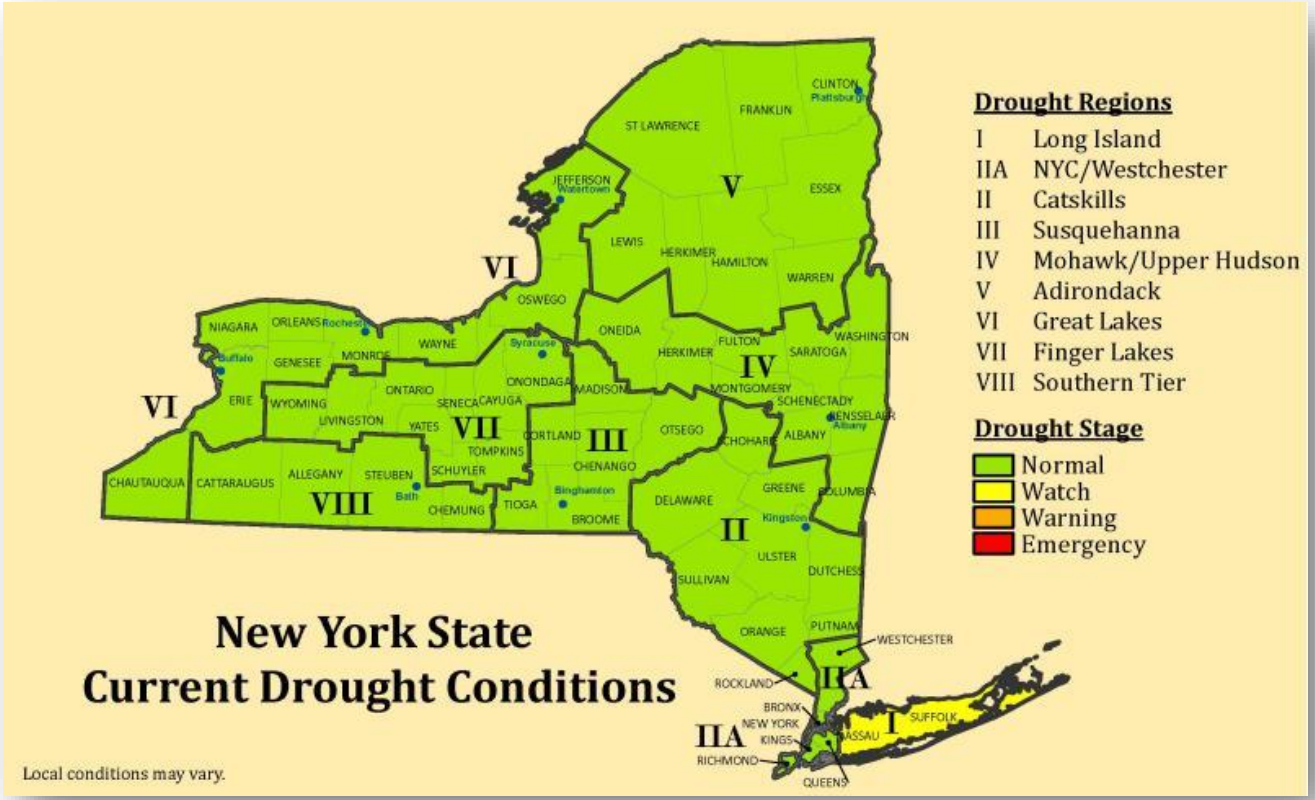
NEW YORK STATE | Department of Agriculture and Markets

DROUGHT MANAGEMENT ASSISTANCE FOR AGRICULTURE

TIM SHELDON
DIVISION OF LAND AND WATER RESOURCES

JUNE 29, 2026

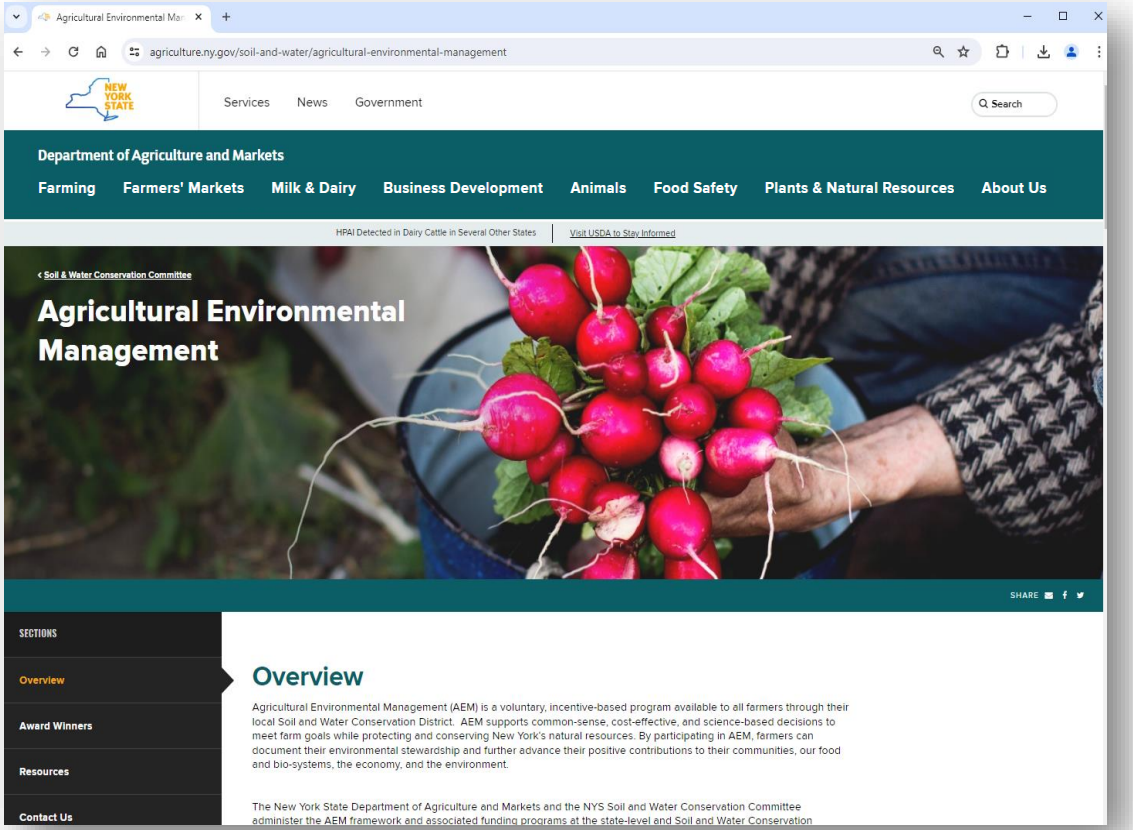
CURRENT DROUGHT CONDITIONS



A "watch" is the first of four levels of state drought advisories ("watch," "warning," "emergency" and "disaster"). There are no statewide mandatory water use restrictions in place under a drought watch, but residents are strongly encouraged to voluntarily conserve water.

AGRICULTURAL ENVIRONMENTAL MANAGEMENT (AEM)

AGRICULTURAL ENVIRONMENTAL MANAGEMENT



Scan for AEM Page

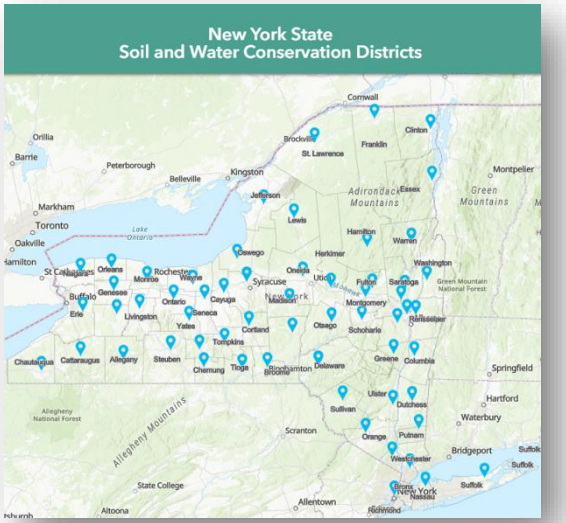
- Offered statewide by the NYS Dept. of Agriculture & Markets / NYS Soil & Water Conservation Committee
- Locally-led by your county **Soil and Water Conservation District**

AGRICULTURAL ENVIRONMENTAL MANAGEMENT

***AEM* = Farmers working with their Soil & Water Conservation District for….**

…..the environment, farm viability, and everything farmers bring to our communities.

- Locally-led by your county Soil and Water Conservation District (SWCD)
  - 58 SWCDs serving all areas of NYS
- Open to all farmers
- Based on relationship building and trust
  - Focused on each farmer's interests and the land they farm
  - Confidential
  - Farm specific environmental assessments and conservation plans
- Voluntary (not regulatory)
- Provides funding for the benefit of farms and the environment
  - No-cost technical assistance through AEM's 5-Tiers
  - Competitive cost-share funding to install practices from AEM Tier 3 plans
  - Funding rounds offered annually



HOW DOES IT WORK?.....AEM FIVE-TIER APPROACH

AEM Tier	Purpose	People
Tier 1 – Inventory (Questionnaire)	Basic info and interests from the farmer	Farmers and District Planners
Tier 2 – Environmental Assessment ("Tier 2 Worksheets")	Walk the farm and discuss stewardship, management concerns, and opportunities for improvements	Farmers and District Planners
Tier 3 – Conservation Planning	Develop conservation plans	Farmers, District Planners, Specialists
Tier 4 – Practice Implementation	Implement conservation practices based on the plans	Farmers, District Planners, Specialists, Engineers, Contractors, Permitters
Tier 5 – Evaluation and Updates	Evaluate/update plans, practices, and programs	Farmers and District Planners

AGRICULTURAL ENVIRONMENTAL MANAGEMENT

AEM Tier 3 Conservation Plan Types

- Farmstead
- Cropland Soil Health
- Nutrient Management
- Pasture / Grazing
- Forest
- Stream Corridor
- Pest
- + combinations from above

AEM Tier 4 Practices (examples)

- Cover Crops
- Nutrient Management
- Conservation Crop Rotation
- Conservation Tillage
- Irrigation Water Management
- Microirrigation
- Water Harvesting Catchment
- Tree Planting
- Stream Buffers
- Pollinator Habitat
- Composting
- Pesticide Facilities
- Petroleum Storage
- Water Diversions
- **+ many more**

CLIMATE RESILIENT FARMING (CRF) GRANT PROGRAM

CRF Program Goals

- Reduce GHG emissions on farms,
- Increase carbon sequestration on agricultural lands, and
- Prepare farms for a changing climate by making farms more resilient.

Track 2 Adaptation & Resiliency

- Goal: Enhance climate resiliency and adaptive capacity of the farm operation. Prepare agricultural producers for flood and drought.
  - Priority practice – water management
  - Design to a higher storm interval or additional redundancies to ensure enhanced resiliency when applicable
  - Water management project location may be off farmland with impact to farmland

Track 2 Eligible Systems

- Riparian Buffer System
- Stream Corridor and Shoreline Management System
- Erosion Control System – Structural
- Green Infrastructure Systems
- Irrigation Water Management System
  - Weather monitoring systems and tools
- Access Control System
- Prescribed Rotational Grazing System

NEXT STEPS…

Visit or call your local Soil and Water Conservation District (SWCD)….

…..to learn more about the AEM 5-Tiers and **annually offered** cost-share programs for environmental management, farm viability, and climate preparedness. *All funding programs require a farm-specific AEM Tier 3 Conservation Plan.*

SWCD Directory

- **AEM Base Program**
  - Technical Assistance through the Tiers from your SWCD
  - Local Cost-Share for Tier 4 Practice Implementation
- **Climate Resilient Farming Program (CRF)**
- **Ag Non-Point Source Program (AgNPS)**
- **Ecosystem Based Management Program (EBM)**

Note, more NYS Ag and Markets programs for farm development, beginning farmers, community gardens, support organizations, and general resources…

QUESTIONS?

TIMOTHY SHELDON *(he/him)*
Climate Policy and Program Analyst

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THANK YOU!

NEW
YORK
STATE
Department of
Agriculture and Markets

WATER CIRCULARITY IN CANNABIS

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Water Circularity in Cannabis:
Techniques for NY Cannabis Growers

Rob Eddy

Horticulturist

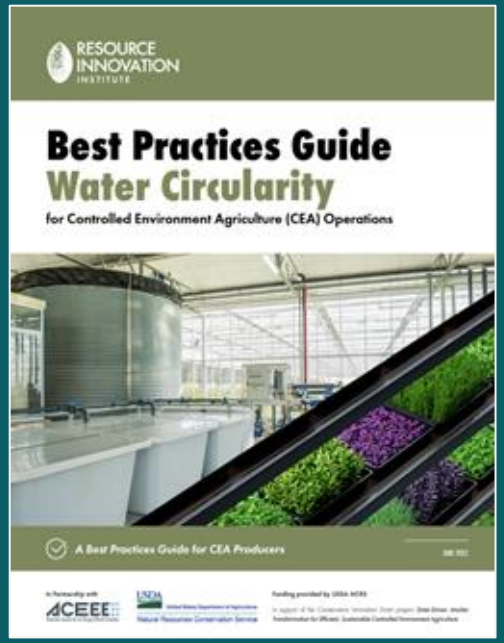
Resource Innovation Institute

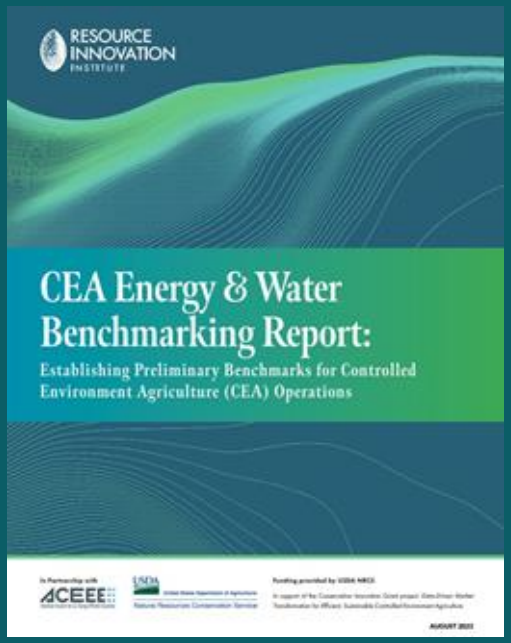
Jared Babik

National Project Sales Manager

DRAMMwater Treatment

CEA WATER CIRCULARITY RESOURCES



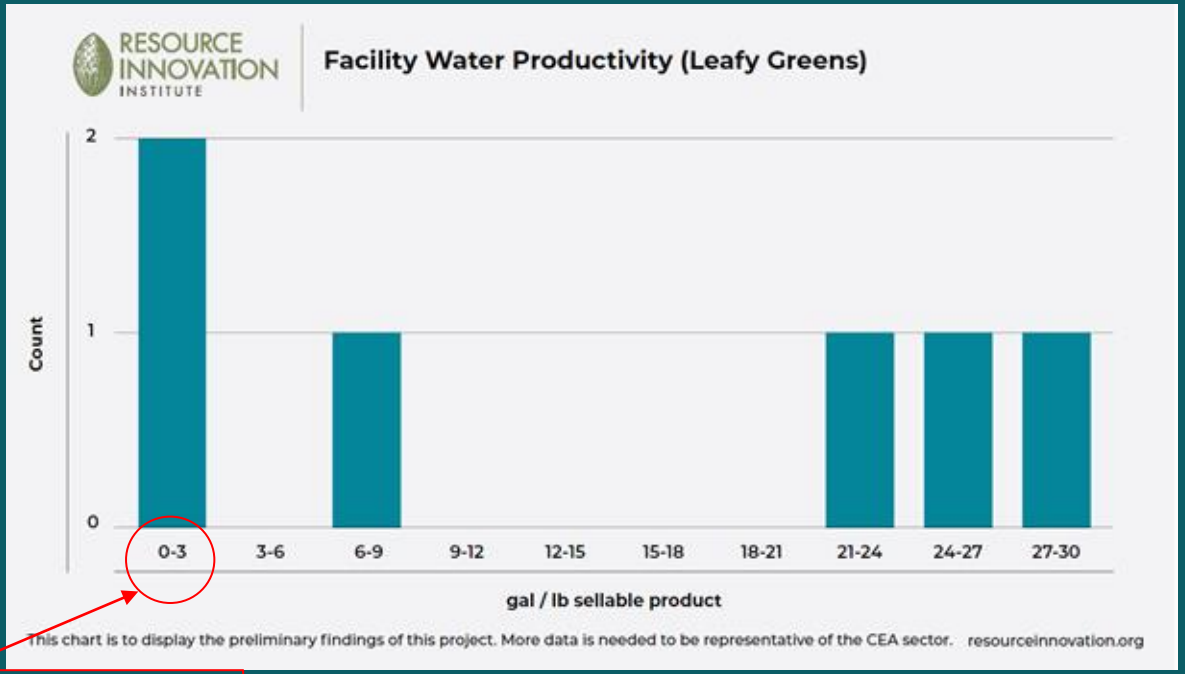


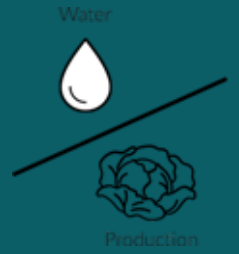
Best Practices Guide Featuring contributions from 15 Working Group member companies

Benchmarking Report Featuring annual resource consumption and productivity of twelve producers growing a variety of crops in greenhouse and indoor facilities across the US.

Access free at https://resourceinnovation.org/publications/

BENCHMARKING REPORT HIGHLIGHTS





90% savings over field

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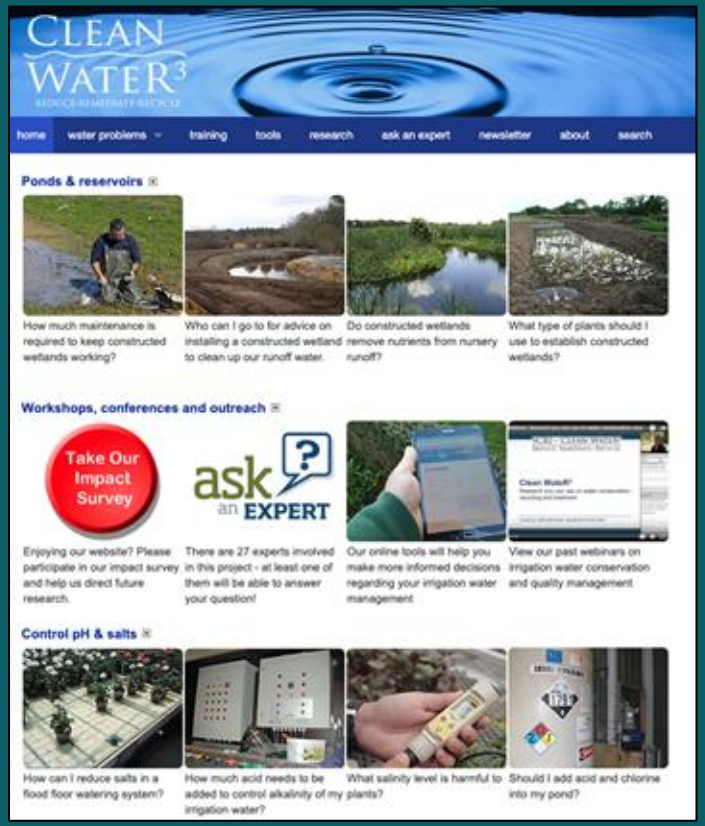

Clean WateR³ is a federally funded Specialty Crops Research Initiative grant focused on research and outreach to help growers Reduce, Remediate and Recycle irrigation water.

CleanWater3.org

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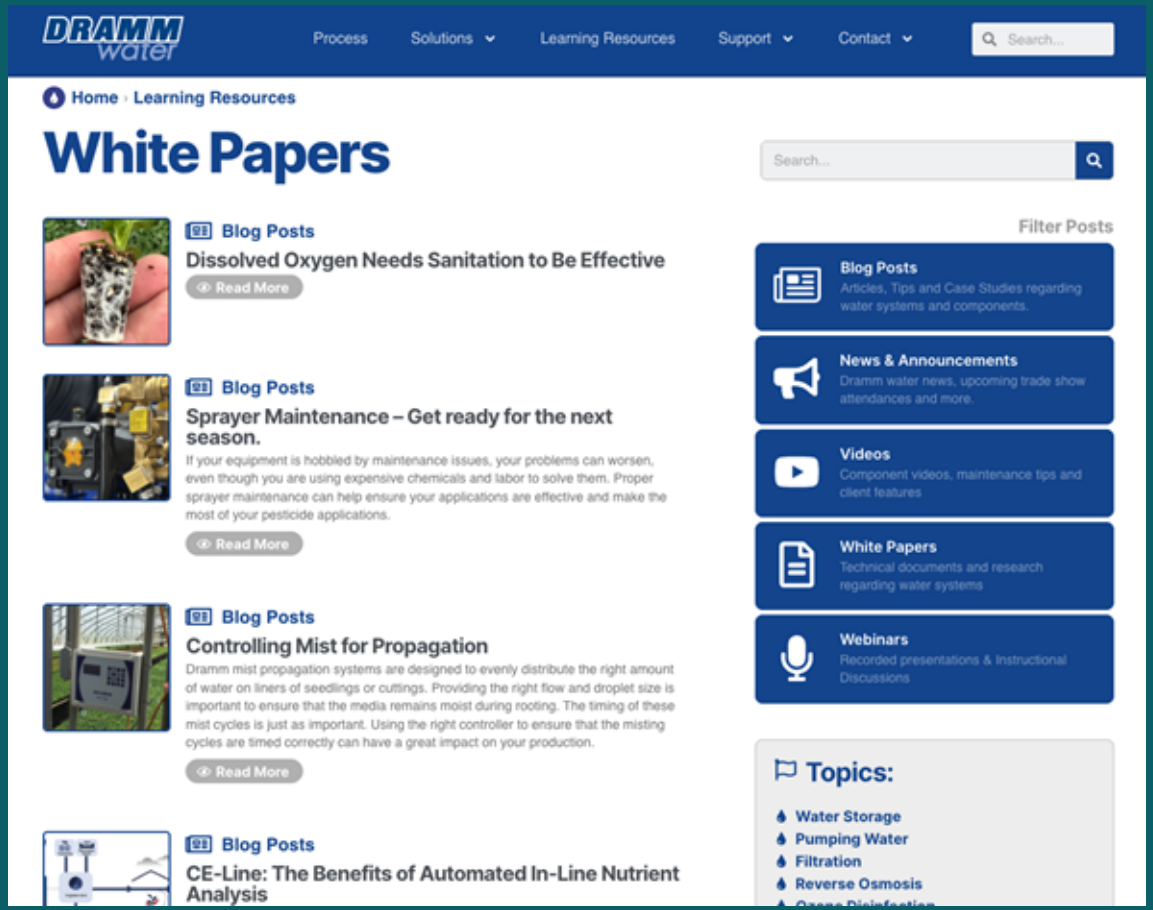

DRAMM water
Process
Solutions
Learning Resources
Support
Contact
Search...
Home › Learning Resources
White Papers
Search...
Filter Posts
Blog Posts
Dissolved Oxygen Needs Sanitation to Be Effective
Read More
Blog Posts
Sprayer Maintenance – Get ready for the next season.
If your equipment is hobbled by maintenance issues, your problems can worsen, even though you are using expensive chemicals and labor to solve them. Proper sprayer maintenance can help ensure your applications are effective and make the most of your pesticide applications.
Read More
Blog Posts
Controlling Mist for Propagation
Dramm mist propagation systems are designed to evenly distribute the right amount of water on liners of seedlings or cuttings. Providing the right flow and droplet size is important to ensure that the media remains moist during rooting. The timing of these mist cycles is just as important. Using the right controller to ensure that the misting cycles are timed correctly can have a great impact on your production.
Read More
Blog Posts
CE-Line: The Benefits of Automated In-Line Nutrient Analysis
Blog Posts
Articles, Tips and Case Studies regarding water systems and components.
News & Announcements
Dramm water news, upcoming trade show attendances and more.
Videos
Component videos, maintenance tips and client features
White Papers
Technical documents and research regarding water systems
Webinars
Recorded presentations & Instructional Discussions
Topics:
Water Storage
Pumping Water
Filtration
Reverse Osmosis

NY WATER QUALITY CHALLENGES

- High alkalinity raises media pH, potentially causing micronutrient deficiencies (iron, zinc, manganese).
- Iron & Manganese Contamination (common in NY groundwater)
- Pathogens
- Biofilm formation in irrigation lines and tanks

BENEFITS OF WATER REDUCTION, REMEDIATION, AND REUSE

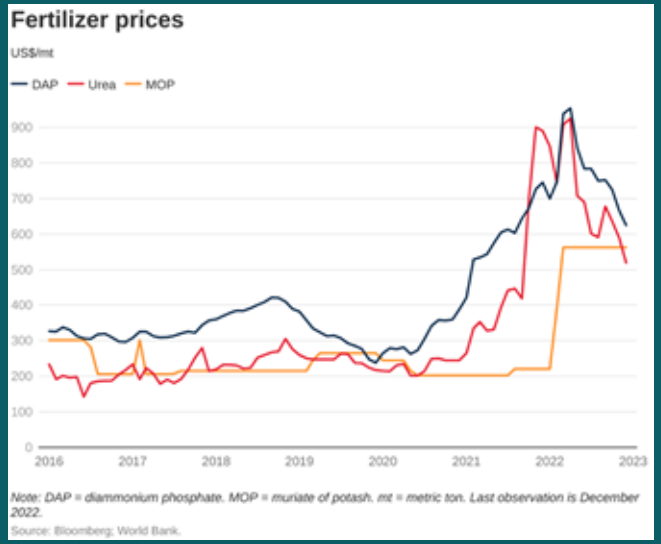
For a cannabis grower, the ROI of water treatment isn't usually measured in water savings, but in **crop insurance**.

One lost harvest due to a Pythium or Fusarium outbreak in a 2,500 sq ft room can cost between **$50,000 and $150,000+** in lost revenue.

ECONOMIC RATIONALE FOR REDUCING WATER CONSUMPTION

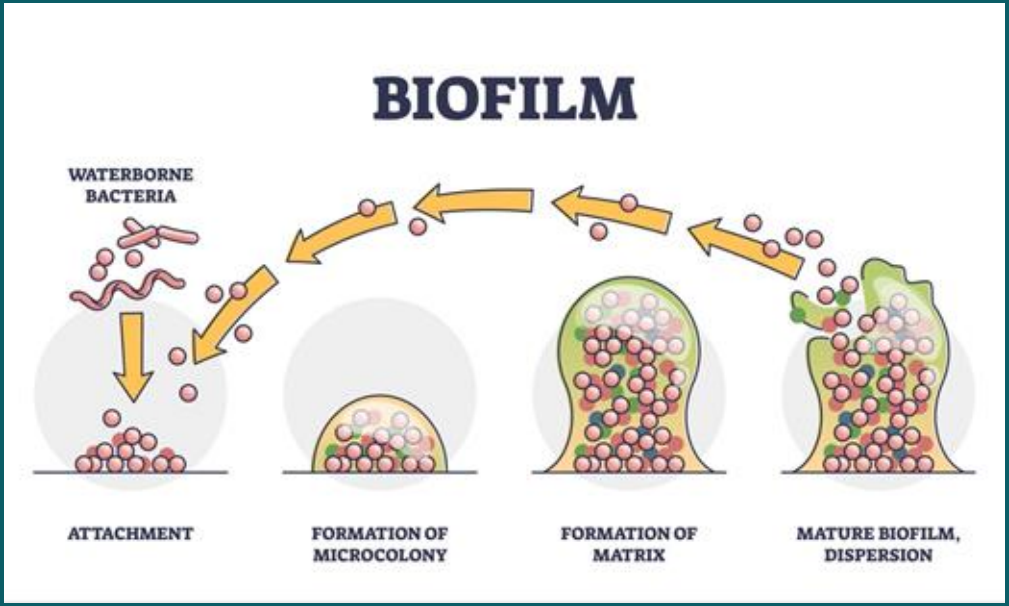
Reducing irrigation water has been shown to reduce fertilizer costs by 40%-50%

CEA producers report ROI in as little as two years due to fertilizer cost reduction



Source: Mohammed, N. (2019). The Advantages of a Closed Hydroponic System in Commercial Greenhouses [Slide show; Powerpoint]. Government of Alberta. https://www1.agric.gov. ab.ca/$Department/deptdocs.nsf/all/green14458/$FILE/Nabeel%20J%20M-%20Oct%202017.pdf

TOP CONCERNS AND HOW TO ADDRESS



TOP CONCERNS AND HOW TO ADDRESS

Fusarium & Mycotoxin Prevention

One attendee noted the link between **Fusarium disease** and **mycotoxins** that can harm humans.

- **Commercial Prevention:** Recirculating water without sterilization is the primary way *Fusarium* spreads.
- **Best Practice:** Oxidative chemicals or high-output ozone to destroy the cell walls of waterborne fungi to ensure mycotoxins do not accumulate in the plant tissue.

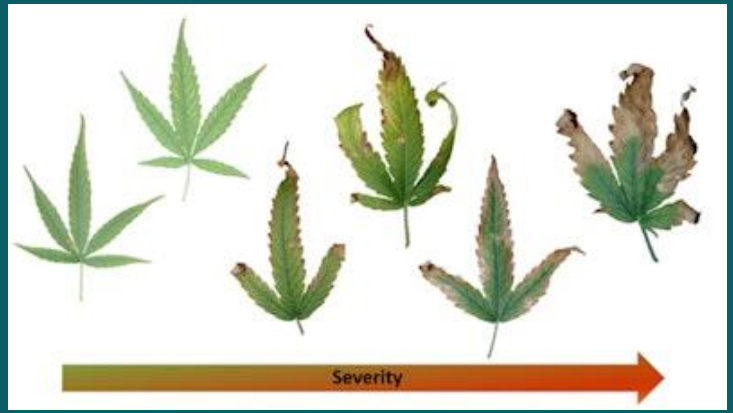
TOP CONCERNS AND HOW TO ADDRESS

Sodium (Na) accumulation

Present in water and fertilizer

Not easily filtered out

<50 ppm in irrigation solution



Paul Cockson

COST EFFICIENT SOLUTIONS FOR:

REDUCING WASTE

SOURCES OF WATER WASTE IN CEA OPERATIONS

Priority Rank	Type of Water Waste	Relevant To All Facilities	Potential High Waste Volume	Release Causes Environmental Harm	Potential Crop Damage	Substitute for RO Water	Potential to Improve ROI on Treatment Costs	Difficult to Remediate
1	Over Irrigation and Leaks	X	X	X	X		X	
2	Irrigation Leachate	X	X	X			X	
3	Pesticide Drench/ Overspray	X		X				X
4	RO Reject Water		X					X
5	Evaporative Cooling Pad Bleed-Off		X					X
6	Condensate		X			X		
7	Washdown Water	X						X
8	Blowdown Water							X

AN OFTEN OVERLOOKED SOURCE OF GH WATER WASTE…

Production Method	Country	Product water use (L/kg)	Product water use (gal/lb)
Open field, general	Israel, Spain, Turkey	100-300	12-36
Open field, drip irrigation	Israel	60	7
Greenhouse, unheated plastic	Spain	40	5
Glasshouse, unheated	Israel	30	4
Greenhouse, regulated ventilation, plastic	Spain	27	3
Glasshouse, advanced controls, CO_2	Netherlands	22	3
Glasshouse, advanced controls, CO_2, closed hydroponic system	Netherlands	15	2
Closed Greenhouse, advanced controls, CO_2, closed hydroponic system	Netherlands	4	0.5
Greenhouse, evaporative cooling	Mexico	Estimated: 100	Estimated: 12

Modified from Nederhoff, Elly & Stanghellini, Cecilia. (2010).

REVERSE OSMOSIS (RO) PURIFICATION

Using tight membrane filtration and pressure, RO strips water down to H_2O, removing competing contaminants, allowing cultivators to build a precise nutrient profile tailored to their strains.

For water with high Total Dissolved Salts (TDS), commercial RO is the most economical process for generating pure, low-TDS water.

Large commercial RO systems can achieve a 75% recovery rate (4-5 gallons of product water for every 1 gallon of waste).

BUT WHAT ABOUT THAT OTHER 25%?

While many growers simply haul RO brine (reject) away, there are technologies that can "treat" the brine to reduce disposal costs:

- **Dilution:** Modern systems can reclaim a portion of the brine or combine it with HVAC condensate to dilute the salt concentration, making it easier to manage.
- **Distillation/Evaporation:** Some large-scale facilities use evaporators to turn the liquid brine into a solid waste (salt cake), which is significantly cheaper to haul away than thousands of gallons of liquid.
- Nanofiltration as an alternative
- Other sources of nearly pure water as an alternative

COST EFFICIENT SOLUTIONS FOR:

REDUCING WASTE THROUGH ALTERNATIVE WATER SOURCES

ALTERNATIVE WATER SOURCE: RAINWATER

Metrolina Greenhouses in Huntersville, NC has been reclaiming rainwater for more than 20 years. They do not draw on the local water table.

ALTERNATIVE WATER SOURCE: HVAC-D CONDENSATE

U.S. research published in 2020 showed condensate water recovery accounted for 67% of the annual water demand for lettuce production

Inspire Transpiration Solutions

Source: Pacak, A., Jurga, A., Drag, P., Pandelidis, D., & Kaźmierczak, B. (2020). A Long-Term Analysis of the Possibility of Water Recovery for Hydroponic Lettuce Irrigation in Indoor Vertical Farm. Part 1: Water Recovery from Exhaust Air. Applied Sciences, 10(24), 8907.

Condensate and Rainwater:

It's not just abundant and high quality...

Utilizing these nearly-pure sources reduces the need for RO purification, thereby reducing the volume of brine created

COST EFFICIENT SOLUTIONS FOR:

REDUCING WASTE THROUGH PRECISION IRRIGATION

REDUCING IRRIGATION WASTE IN HORT SUBSTRATE CULTURE

Netafim

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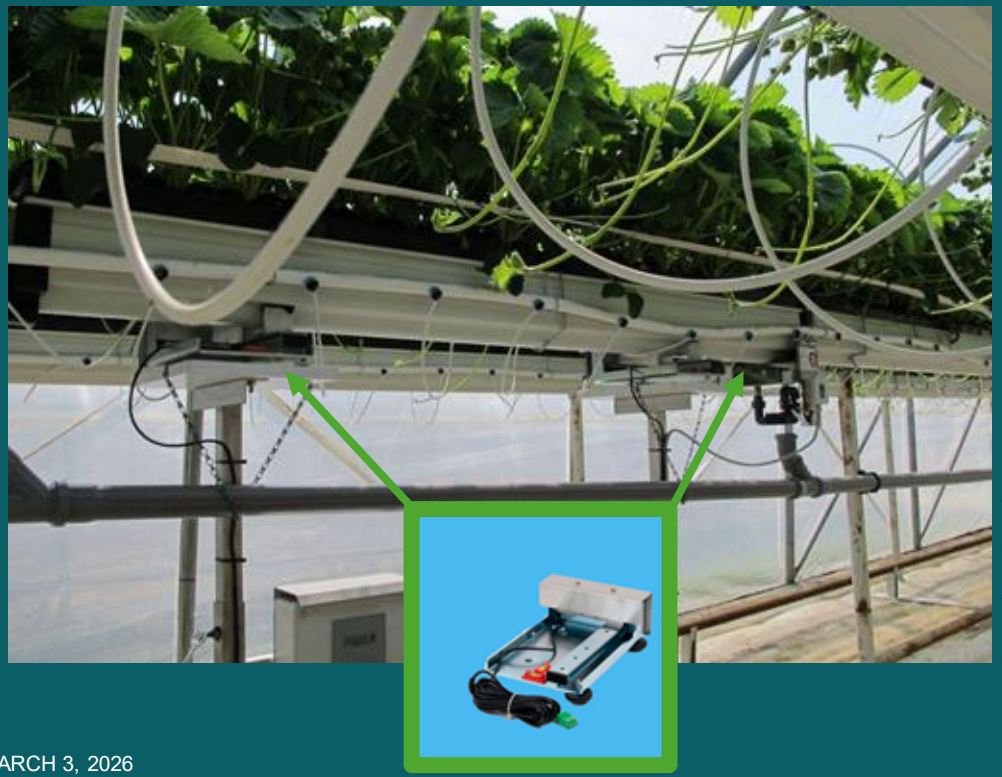
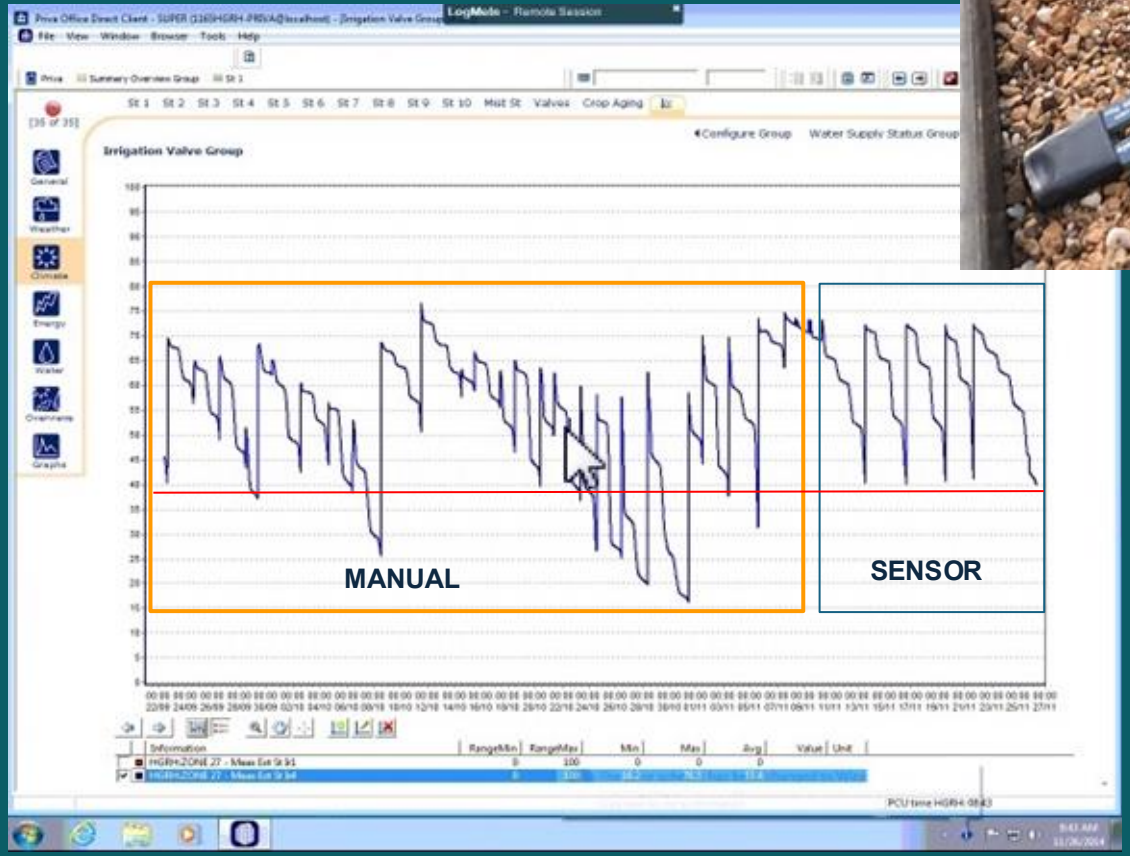
TRIGGERING IRRIGATION BY WEIGHT MEASUREMENT



Powerplants Australia

Drain Sensors (volume, EC)

TRIGGERING IRRIGATION WASTE BY WATER CONTENT



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TRIGGERING IRRIGATION BY WATER CONTENT

STONE WOOL IRRIGATION OVER 24-HOURS

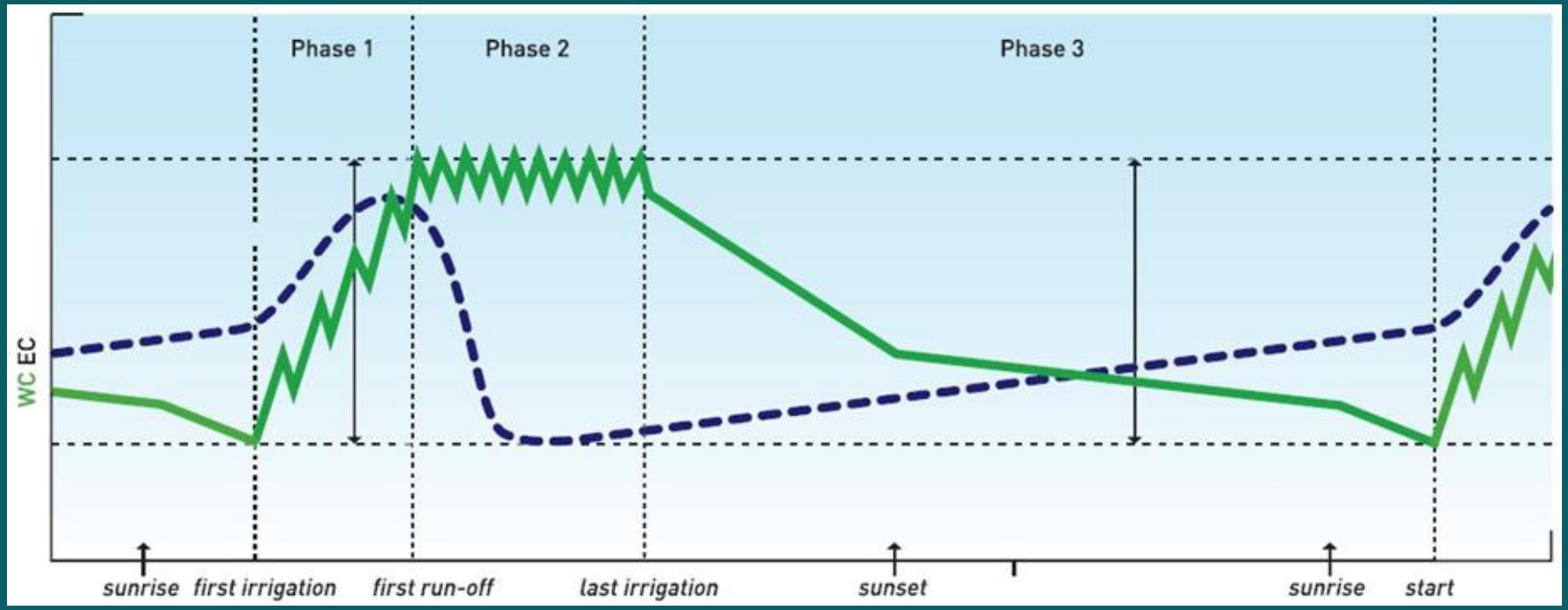
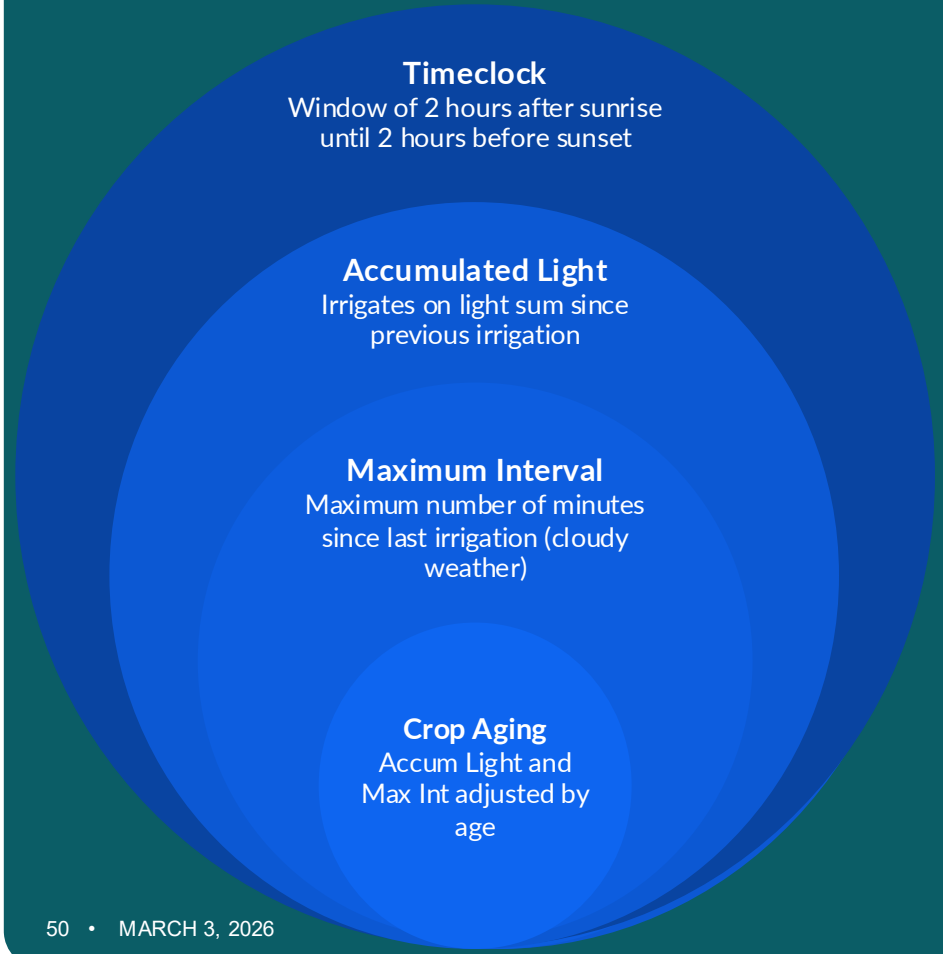


Image credit: Grodan and Priva

REDUCING IRRIGATION WASTE BY SMART PROGRAMMING



Example of layering environmental variables to trigger irrigation

Priya and Grodan

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OUTDOOR: IRRIGATION TIMING AND MULCHING

- Timing: Water thoroughly and less often to encourage deep root growth. Time watering for early morning or late evening when evaporation and transpiration rates are lowest.
- Mulching: Apply organic mulch (e.g., wood chips, straw) around plants or beds to reduce surface evaporation and keep soil cooler.

OUTDOOR: STRAIN SELECTION AND HYDRO-ZONING

Strain Selection: Choose more drought-tolerant strains

Hydrozoning: Block plants by water needs to ensure high-demand plants aren't overwatered.

COST EFFICIENT SOLUTIONS FOR:

RECAPTURE, REMEDIATION AND REUSE

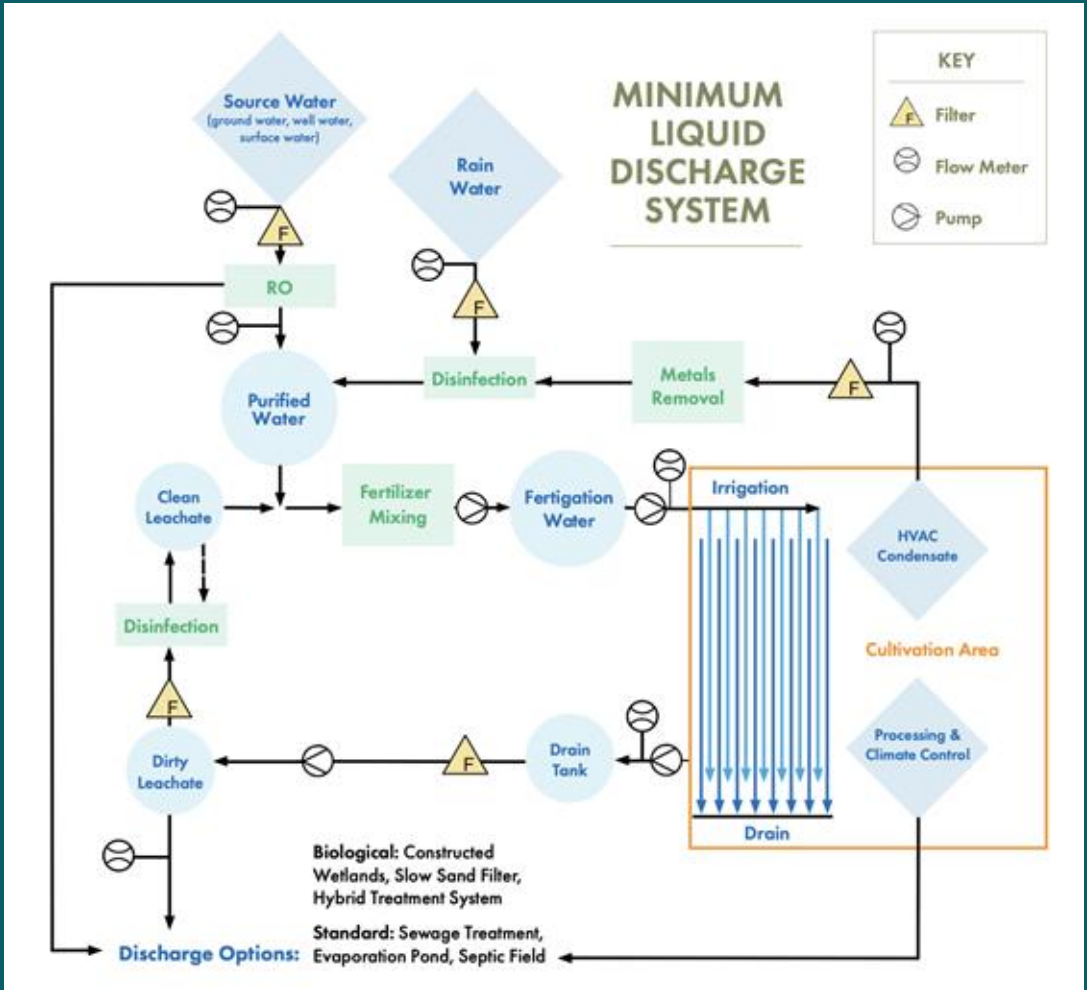
RECIRCULATING & CLOSED-LOOP SYSTEMS

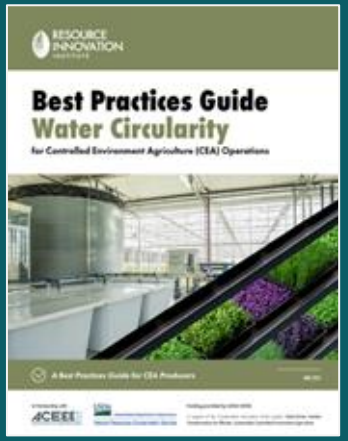
Leachate (drainage) is directed via troughs or gutters to a storage tank and then pumped to a water treatment area for filtration, disinfection, and nutrient rebalancing before reuse

Recirculating the nutrient solution reduces fresh water consumption by 20%–40% and can cut fertilizer costs by 40%–50%.

Silver Bullet

Water Treatment Area





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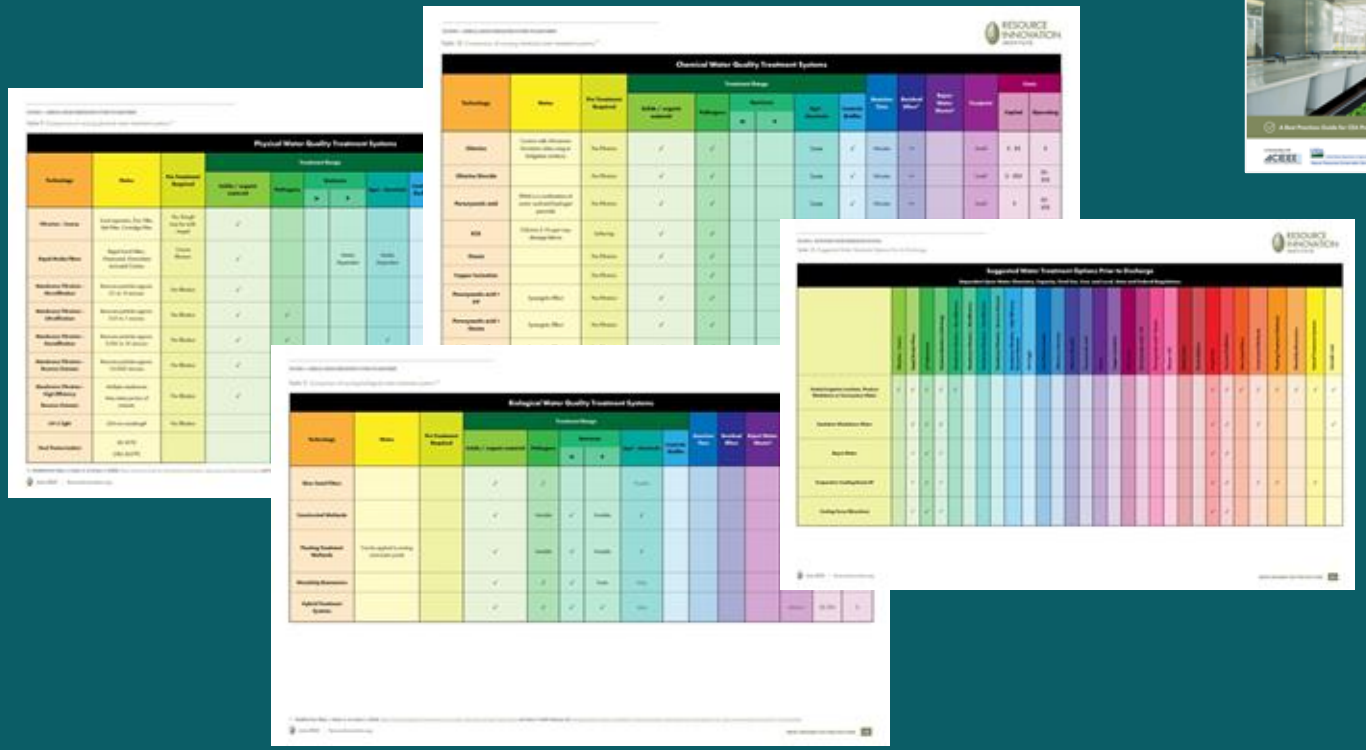
LAYERED STRATEGY: PHYSICAL, CHEMICAL, BIOLOGICAL



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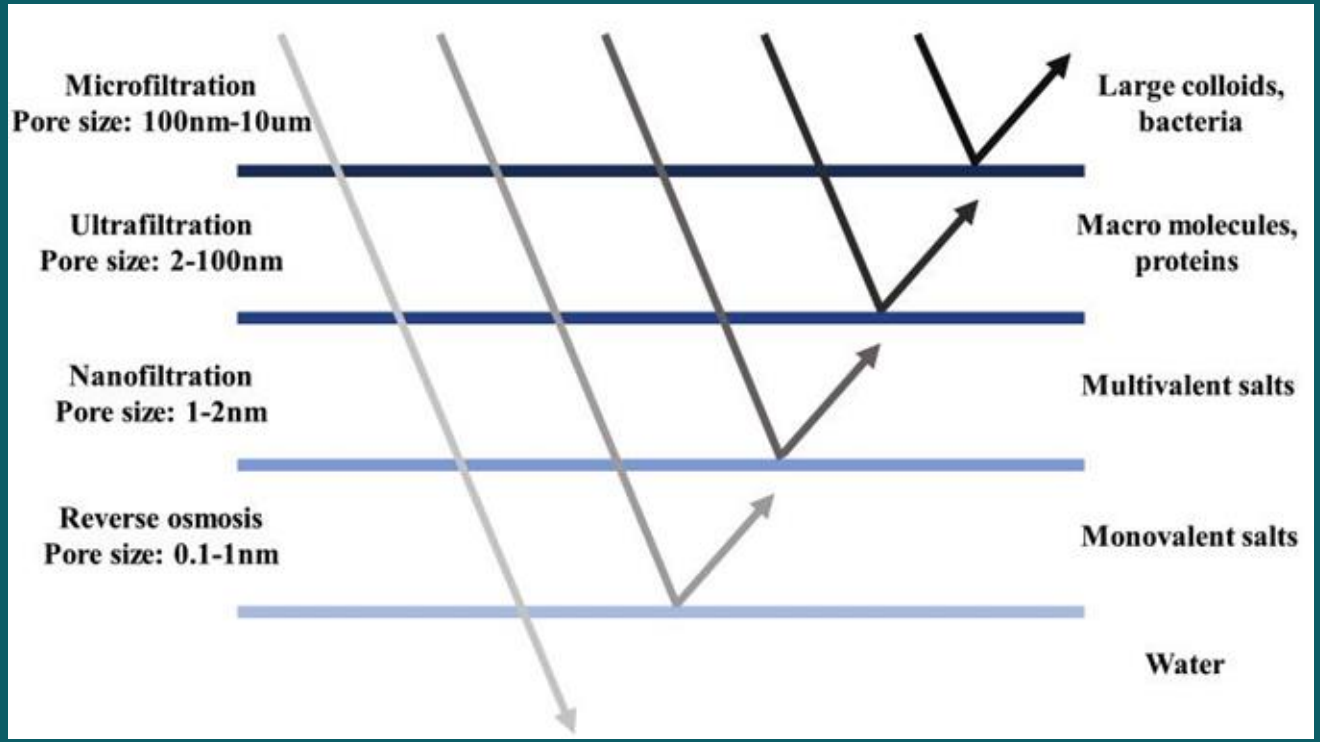
Chemical Water Quality Treatment Systems

Technology	Notes	Pre Treatment Required	Treatment Range						Reaction Time	Residual Effect*	Reject Water Waste?	Footprint	Costs	
			Solids / organic material	Pathogens	Nutrients		Agri - chemicals	Controls Biofilm					Capital	Operating
					N	P								
Chlorine	Caution with chloramine formation when using in fertigation solutions	Pre-filtration	✓	✓			Some	✓	Minutes	++		Small	$ - $$	$
Chlorine Dioxide		Pre-filtration	✓	✓			Some	✓	Minutes	++		Small	$ - $$$	$$ - $$$
Peroxyacetic acid	(PAA) is a combination of acetic acid and hydrogen peroxide	Pre-filtration	✓	✓			Some	✓	Minutes	++		Small	$	$$ - $$$
ECA	Chlorine 2-10 ppm may damage lettuce	Softening	✓	✓				✓	Minutes	+		Small		
Ozone		Pre-filtration	✓	✓			Some	✓	Minutes	+		Medium	$$$	$
Copper Ionization		Pre-filtration		✓					Hours	++		Small	$$$	$
Peroxyacetic acid + UV	Synergistic Effect	Pre-filtration	✓	✓			Some	✓	Minutes	++		Medium	$$$$	$$$ - $$$$
Peroxyacetic acid + Ozone	Synergistic Effect	Pre-filtration	✓	✓			Some	✓	Minutes	++		Medium	$$$$	$$$ - $$$$
Ozone + UV	Synergistic Effect	Pre-filtration	✓	✓			Some	✓	Minutes	+		Medium	$$$$$	$$
Deionization	Higher purity than typically needed	Pre-filtration and Reverse Osmosis to reduce cost	✓	✓	✓	✓	✓		Minutes		+++	Medium	$$$$$	$$$

*All technologies other than point treatments such as membrane filtration or UV have potential for phytotoxicity at high doses. Make sure to follow label and manufacturer recommendations on dose, monitoring, and maintenance.

77 Modified from West, J., Huber, A., & Carlow, C. (2018). Water Treatment Guide for Greenhouses & Nurseries. Agriculture and Agri-Food Canada, and Fisher, P. (2020, February 18). Managing Water Quality and Biofilm for Indoor Production. Indoor Ag Science Cafe [episode 16]. https://www.youtube.com/watch?v=O7wWWLIEdk

MEMBRANE FILTRATION

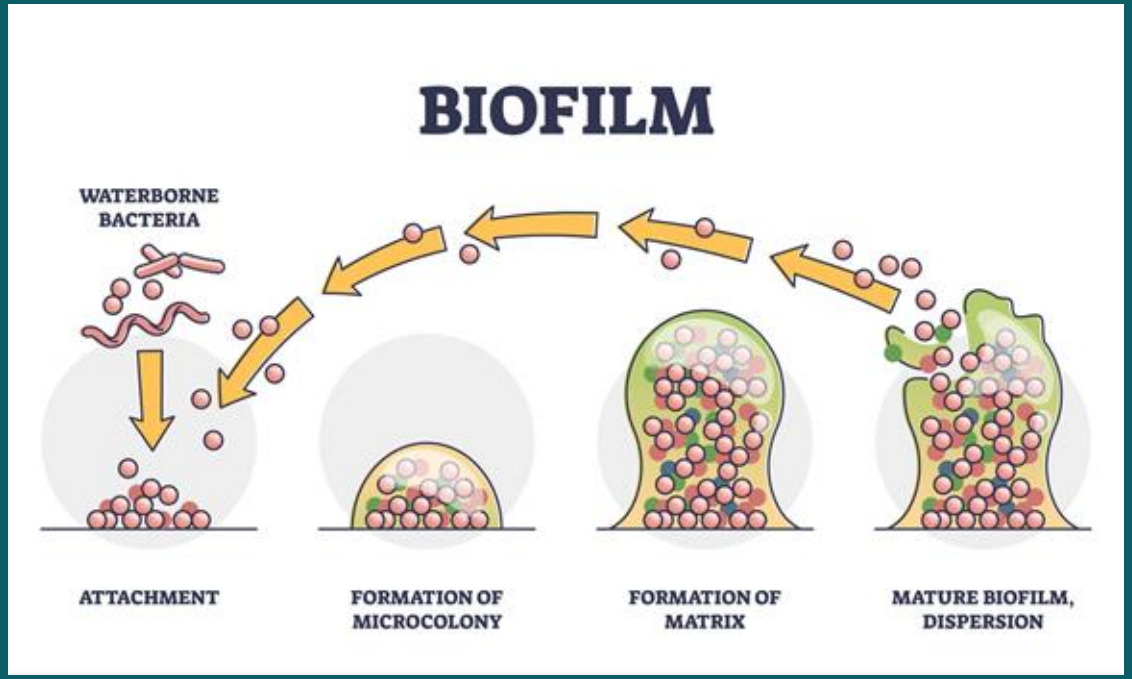


RECYCLING CONDENSATE FROM HVAC-D UNITS

Condensate is essentially distilled water, but it often picks up Lead, Copper, and Zinc from the cooling coils and soldered joints of AC units.

Heavy Metal Removal: Use an ion-exchange or carbon media filter designed for heavy metals.

Sanitization: Condensate is prone to bacterial growth. UV is a budget-friendly point-source solution, but ozone is better for long-term storage in tanks.



Need “residual” control that goes downstream

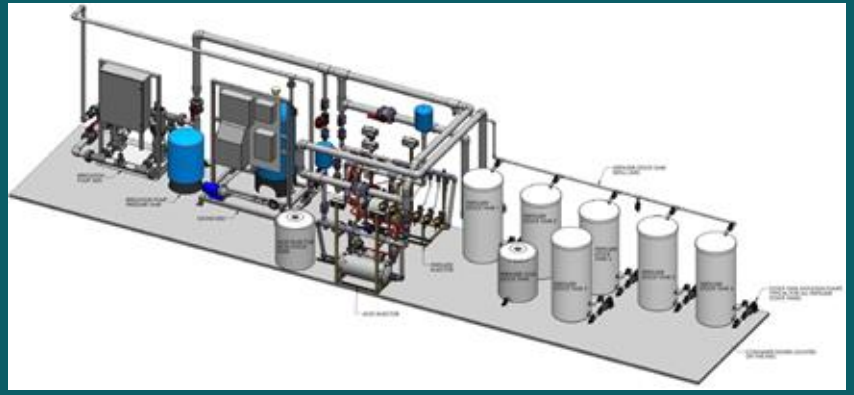
UV is not residual

Control options:

- -Ozone
- -ECA-water
- -Peroxyacetic acid
- -Chlorine dioxide
- -Nanobubbles

COST EFFICIENT SOLUTIONS FOR:

PUTTING IT ALL TOGETHER



DrammWater Treatment

ECONOMICS OF "DUMPING" VS RECIRCULATING

(5,000 sq ft cannabis operation)

"Trades CAPEX for OPEX"

	Dumping (Manual Flush)	Ozone w/ Recirculation
Upfront Cost	$0 (assuming basic plumbing)	$15k - $18k
Annual Nutrients	$30k - $40k	$20k - $28k
Compliance Cost	High (Permits + Surcharges/Hauling)	Low (Minimal discharge)
Yield/Health	Variable (6ppm O2 risk)	Highest (12-15ppm O2)
ROI / Payback	Costs grow over time	2–3 Year Break-even

COMPARING WATER TREATMENT SYSTEMS FOR HYDROPONICS

(5,000 sq ft cannabis operation)

	Ozone (OXS-30)	ClO2 + Nanobubble	H2O2 + Nanobubble	UV
Strategy	Standalone All-in-One	Performance Hybrid	Lower-Entry Hybrid	Point-Source Only
Initial Setup	Highest ($18k+)	High ($19k)	Moderate ($17k+)	Low ($4.5 - $8k)
OpEx / Monthly	Lowest (Electricity)	Medium (Chemicals)	Highest (Consumables)	Low (Bulbs)
O2 Level (at 83F)	High (12-15 ppm)	Highest (20+ ppm)	Highest (20+ ppm)	None (Static 6ppm)
Biofilm Impact	Aggressive Removal	Excellent Residual	Maintenance Level	None (In-pipe growth)
Hazardous Storage	None	Precursor Acids	High (Oxidizer)	None
Workflow	Fully Automated	Weekly Mixing	Barrel Swaps	Bulb Maintenance
ROI Period	2-3 Years	4-5 Years	5+ Years	1-2 years

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Thank You!

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ADDITIONAL RESOURCES

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- Department of Agriculture and Markets Agricultural Environmental Management page
  - https://agriculture.ny.gov/soil-and-water/agricultural-environmental-management
- New York State Drought Watch and Warning Fact Sheet
  - https://dec.ny.gov/sites/default/files/2024-11/droughtwatchwarningfs.pdf
- Resource Innovation Institute
  - Best Practices Guide for Water Circularity
    - https://resourceinnovation.org/wp-content/uploads/2023/06/RII-Water-BPG-2023.pdf
  - CEA Energy & Water Benchmarking Report
    - https://resourceinnovation.org/wp-content/uploads/2023/08/RII-Benchmarking_2023.pdf

ADDITIONAL RESOURCES

- May 13, 2026 @ 4:20 PM: NYS PowerScore Demonstration and Q&A
  - https://meetny-gov.webex.com/weblink/register/r6c124f01fd80d2fb629defc95e2514f0
- Office of Cannabis Management Sustainability webpage
  - https://cannabis.ny.gov/sustainability
- Office of Cannabis Management YouTube page
  - https://www.youtube.com/@NYS_Cannabis
- New York State PowerScore platform
  - https://cannabispowerscore.org/new-york/

Scan QR code to register for May 13 webinar: **NYS PowerScore Demonstration and Q&A**

QUESTIONS?

Office of Cannabis Management