Welcome to the 2020 Water Conservation Symposium

We will get started in a couple minutes.
Who is CWW?

- Colorado WaterWise is addressing the state's water challenges by improving water efficiency through diverse community connections, innovative solutions and valuable member resources.
- We offer educational tools, events and resources to our members and the public to allow you to make a difference.
2020 Symposium Sessions

• **Oct. 13 1 p.m.** - System-wide technologies: real-world review of AMI and Leak Detection systems

• **Oct. 15 10 a.m.** - Managing water in the headwaters of Colorado

• **Oct. 20 10 a.m.** - Supporting water resources through alternative water supplies

• **Oct. 22 1 p.m.** - Introduction to landscape and irrigation certification programs in Colorado

• **Oct. 27 2 p.m.** - Understanding water conservation efforts across Colorado

• **Oct. 29 10 a.m.** - Advancing Water Efficient Landscape Ordinances: What’s been done and where do we go next?
Thank you to our 2020 sponsors
JOIN US!
COLORADO WATERWISE
SYMPOSIUM
HALLOWEEN
HAPPY HOUR
COSTUME CONTEST!
OCTOBER 27 | 4 TO 5:30 PM
ZOOM
Housekeeping items

• Drop questions into the Q&A box and we will address them toward the end.
• We will use audience polling throughout the session, we look forward to hearing from you all!
• A recording will be available to CWW members following the Symposium.
Luke – do you want any more of an intro besides what’s on the next slide to set up this session?
Alternative Water Supplies
Jeff Tejral, Denver Water
John Bell, Greyter Systems
Deryn Davidson, CSU Extension
Thersa Worsham, City of Golden

Moderator: Luke Runyon, KUNC
Framing Alt Water sources – Alt water use

• Why alternative water sources important
• What are the sources
• What are the uses
• Pros and cons
• One Water
• Polling question
  • Pre presentation - Is it legal to:
    a. Direct water from your roof to landscape
    b. Store water from showers to irrigate trees
    c. Direct laundry water to landscape
    d. Use a bucket to keep warmup water from showers
Why Water Utilities Involved

• Must provide water “forever”
• Even in the face of climate change
• Must operate 24/7/365 in all conditions
Water Scarcity - Who Cares?

Top 5 Global Risks in Terms of Impact

Source: World Economic Forum
Historic norm

Well water

Potable water

Rainwater

Wastewater
Alternative Water Sources, Use & Regs

- **Rainwater**
  - Irrigation

- **Well water**
  - Irrigation
  - Domestic
  - Cooling

- **Black water**
  - Irrigation
  - Toilet flushing

- **Recycled water**
  - Irrigation
  - Toilet flushing
  - Cooling

- **Gray water**
  - Irrigation
  - Toilet flushing

- **Potable water**
  - Irrigation
  - Domestic
  - Cooling

- **Storm water**
  - Irrigation

- **Clean Water Act**
  - Reg 84

- **State Water Law**
  - Reg 41 & Reg 11
  - Reg 43 & Reg 22
  - Reg 11

- **Safe Drinking Water Act**
  - Reg 86

- **Other water**

[Links to State Water Law, Clean Water Act, Regs 41 & 11, 43 & 22, 11, 84, 86, Safe Drinking Water Act]

[https://www.colorado.gov/pacific/cdphe/water-quality-control-commission-regulations]
Pros and cons of alternative water use

**Pros**
- Reduce stress on potable system
- Lower long-term costs
- Reliable water during drought
- Increased management

**Cons**
- Cross connection contamination
- Higher upfront costs
- Conflicting regulations
- Increased management
One Water

- Collaboration
- Climate Resilience
- Community Engagement
- Integrated Water Management
NOTE: Last slide of introduction

I can have my next three slides any time in the presentation but thought it might be nice to have someone else talk for a few minutes.

DO WE WANT TO HAVE JEFF STOP HERE? Or go over the next three slides then more onto Deryn?
Denver Green School

- Rainwater harvesting
- Augmentation Plan
- Flood mitigation / management pilot
- Mile High Flood District
Rain Gardens

• Infiltrate within 72 hours
• Green Infrastructure needs design and maintenance
GREYTER WATER SYSTEMS, INC.

Colorado WaterWise – Supporting water resources through alternative water supplies
WHAT WE DO

We build water efficient communities and have both a residential and commercial product line.

**Showers**

We capture greywater which is wastewater generated from showers and baths and bathroom sinks.

**Flushing**

There are many economical ways to reuse greywater on-site such as for toilet flushing, irrigation (watering lawns and gardens).

**Irrigation**
MOST INTERIOR WATER USAGE HAPPENS IN THE BATHROOM

Showering and Bathing  25-30%

Toilets  20-25%

*Representative of new home construction
SO, WHY DO WE FLUSH TOILETS WITH DRINKING WATER?

Why do we flush toilets with potable water?

And, why do we send shower and bath water directly to the sewer?
WITH THE AWARD WINNING GREYTER HOME YOU DON’T HAVE TO

The Greyter HOME captures and treats shower and bathwater so that it can be reused for flushing toilets

Benefits:
• Supplies all of the water for toilet flushing
• Reduces indoor water consumption by as much as 25%

The single greatest water conservation appliance for new homes
HOW IT WORKS
**NSF 350 Certification**

The Greyter HOME™ (Model GH1118) by Greyter Water Systems is certified to NSF 350.

During a 6-month testing period, the Greyter HOME™ was tested daily with a graywater reactor that contained raw wastewater, secondary effluent, shop sink, sump, toilet, soap, dishwashing, and shower. The reactor was kept clean and wet with water, and a total of 30 gallons (115 liters) of treated water was delivered every day. The Greyter HOME™ did not require any user maintenance during the testing period and maintained the following stringent water quality requirements:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>NSF 350 Standard (Class R)</th>
<th>Greyter HOME™ Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBODs (mg/L)</td>
<td>10</td>
<td>&lt; 2*</td>
</tr>
<tr>
<td>TSS (mg/L)</td>
<td>10</td>
<td>&lt; 2</td>
</tr>
<tr>
<td>Turbidity (NTU)</td>
<td>5</td>
<td>0.07</td>
</tr>
<tr>
<td>E.Coli (CFU/100 mL)</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>Residual Chlorine (mg/L)</td>
<td>0.5 - 2.5</td>
<td>0.95</td>
</tr>
<tr>
<td>pH (US)</td>
<td>6 - 9</td>
<td>7.7</td>
</tr>
</tbody>
</table>

*Note: Average test results less than detection limit*

The Greyter HOME™ is a one-of-a-kind solution that not only meets the NSF 350 standard for residential greywater reuse, but also meets the following requirements:

- **Cost-effective** ($1500 USD)
- **User-friendly (annual maintenance)**
- **Low energy consumption** (~150 kWh annually)
- **Easy to install (~ 1.5 hours)**
- **Superior water quality**

Many U.S. jurisdictions require NSF 350, as it is the emerging water quality standard for residential greywater reuse.

The Greyter HOME™ is designed to capture only clean and bath water to be reused for toilet flush. Tanks make up 20-25% of indoor water consumption. It makes no sense to flush toilets with perfectly good drinking water, and now with the Greyter HOME™ you don’t have to!

Make your Home a GreyterHOME™. Now NSF 350 Certified (Model GH1118).

**CERTIFICATION**

- NSF 350 required in most U.S. jurisdictions
- 6-month test
- Most demanding standard for greywater
- Standard driven by public health agencies
- Greyter currently the only solution with NSF for residential (Class R) that meets requirements for builders
1. Isolate greywater - Minimum 2 showers (2’), and homen run greywater to mechanical room or where future Greyter HOME will be installed
2. If overflow is tying into a 3’ soil or waste stack, connection is a 3’ x 4” cleanout with 2” side fitting. If tying into a 2’ soil or waste stack, connection is a 2’ x 2” cleanout with 2” side fitting. Fitting to to be tight to the slab.
3. Isolate supply lines to toilets (purple pipe only, must read "Non-Potable Water, Do Not Drink")
4. Provide access to future 1.5” vent, must be minimum 75’ off finished floor
5. Provide single gang 15 Amp (dedicated), 120V. Plug should be 70-75” above finished floor, within 12” of the right side of unit
6. To accommodate backflow assembly plate, allow a minimum clearance of 3’ to the right of the Greyter HOME. Backflow plate is 15” x 20.25”, and should be mounted securely to the wall at a minimum height of 36-48” from the finished floor (as measured from the top of the backflow plate)
7. Where space permits, install Greyter HOME within 24” of floor drain. If no floor drain is available, drain to d or alternate location which permits the Greyter HOME mechanical tank to drain under gravity
1. Building shower/bath drain only, connected to Greyter HOME prefilter inlet (2” flexible tee)
2. 2" Greyter HOME overflow connection tied into a waste stack, either dedicated 6”-8” from right side of unit or rear unit (2” flexible coupling supplied)
3. 1-1/2” Greyter HOME vent tied into building venting system (1-1/2” flexible coupling supplied)
4. 3/4” greywater outlet connection from Greyter HOME to backflow assembly (Valve 1 – Grey Out)
5. 3/4” fresh water connection from Greyter HOME to backflow assembly (Valve 1 – Fresh In)
6. 3/4” dedicated supply to toilets; Purple pipe only, must read "Non-Potable Water. Do Not Drink"
7. 3/4” potable connection from main or potable supply into backflow assembly
8. 3/4” backflow drain; plumber to determine appropriate connection (i.e. floor drain, hub drain, laundry tub)
Designed to meet the 7 key requirements of Production Home Builders:

1. Compact Footprint
2. Affordable
3. Delivers Near Potable Water
4. Minimal Maintenance
5. Quick & Easy Installation
6. Highly Efficient Water Recycling
7. Low Energy Requirements

**Possible Builder Benefits:**
- Build Homes Faster - Accelerated permit approvals
- Development credits
- Build More Homes - Greater density of homes in a development
- Lower Water Connection Charges
- Assist with site plan approval – meet sustainable checklists
COLORADO LAUNCH

Pilot Project in partnership with:

Colorado Conservation Water Board
Denver Water
Lennar Homes
Uponor
Phyn

40 Homes in Central Park Site
First 2-units installed – 3 homes occupied by mid-December

First project in the state to incorporate greywater for single family indoor use, leak detection and structured plumbing
Sustainable Water Solution –
The Best Way to Plumb a Home

1. Water leak device and flow monitor – shuts main off remotely when catastrophic leaks and saves water. Up to 15%

2. Logic plumbing provides faster distribution to fixtures and saves water.

3. 2 showers a day provides enough greywater for a family of 4
The Greyter HOME reduces indoor consumption by up to 25%.
Significant savings with the Sustainable Water Solution

~ 9,300 G + ~1,000 G + ~15,000 G

Single family home of 4 saves ~ 25,000 G annually
COLORADO REQUIREMENTS

Certification – NSF 350

Reg 86 Adoption or local greywater ordinance

Currently for single family low rise – greywater to toilets only permitted in:

Denver, Castle Rock and Pitkin County.
ORDINANCE NO. 2018-

AN ORDINANCE AMENDING TITLE 4 OF THE CASTLE ROCK MUNICIPAL CODE
ADDING A NEW CHAPTER 4.05 ENTITLED GRAYWATER SYSTEMS

WHEREAS, the Town of Castle Rock recognized that wise water use requires efficient and effective water reuse;

WHEREAS, the Town’s preferred water supply strategy, as set forth in Castle Rock’s Water Resources Strategic Master Plan, includes fully utilizing its reusable water,

WHEREAS, indoor graywater systems have demonstrated water conservation savings in the amount of 20-25% of indoor water use in a typical residential home,

WHEREAS, the Colorado Department of Public Health and Environment and Colorado’s Water Plan value the importance of water reuse to the future of the Front Range and the State of Colorado as a whole.

WHEREAS, Section 13.12.110 of the Castle Rock Municipal Code provides for the adjustment of service charges to defray, among other costs, all “construction of water reuse and water recharge facilities, the establishment of water conservation programs and design, management, planning, operations, maintenance and regional agreements associated with such overall water and sewer long-term resource plans and programs,” and

WHEREAS, this ordinance provides clear guidance to homeowners and homeowners regarding the implementation of graywater systems.

NOW, THEREFORE, IT IS ORDAINED BY THE TOWN COUNCIL OF THE TOWN OF CASTLE ROCK, COLORADO:

Section 1. Amendment. Title 4 of the Castle Rock Municipal Code is amended by the addition of a new Chapter 4.05 entitled Graywater Systems, to read as follows.

4.05.010 Graywater systems.

A. Requirement. Graywater systems shall comply with the minimum requirements of Colorado State Regulation 86, as well as any and all other applicable state and local requirements.

B. Castle Rock Water’s service boundary including Town limits and areas served through Extraterritorial Agreements shall constitute the legal boundary for
• Colorado one of the most water conscious U.S. states (Water Plan)

• Colorado one of the most complicated U.S. states (Water rights)

• Colorado one of the most expensive U.S. states (Tap fees)

• Colorado one the most important U.S. states (Greyter)
Thank you

John Bell, CCO
Greyter Water Systems Inc.
1-844-GREYTER (479-9837)
www.greyter.com
Every Drop Matters

CWW - Supporting water resources through alternative water supplies

Deryn Davidson, CSU Extension, Boulder County
Rainwater Harvesting

- **Active** water harvesting = capture rainwater in a container to hold for later use (tank storage)
- **Passive** water harvesting = divert water overland to vegetated areas for *immediate* use (soil storage)
Melissa: Poll Question

1. Do you have rain barrels at home? Yes/No
2. Do you see rain barrels at customers homes? Yes/No/NA
Why Do Rainwater Harvesting?

Urbanization and where we live...arid west

• Western US: 60% of municipal fresh water is used for landscape
• ~50% (mostly turf)
Benefits of Rainwater to Plants

• It’s water…it’s free!
• CO rainwater is generally soft and low in salts
• It’s also unchlorinated, which is beneficial to plant growth
• May contain small amounts of nitrogen
  • That’s why we generally see a greening effect after a rain event
Colorado Water Law: Active harvesting

• CSU conducted a study that determined there would be no adverse effects on senior or junior water rights of downstream users.

• The conclusion was that rain barrels were a fraction of the total water balance and the amount collected by homeowners is miniscule.

• Current Law: HB16-1005
  • August 2016
How to *legally* use rain barrels

- Allows up to *two* rain barrels with a combined storage of no more than *110* gallons
- Allows any *single family* home, or *multi family units with 4 or less units* to collect from the roof
- Water MUST be used on SAME PROPERTY that it is collected on
- The collected precipitation is used for OUTDOOR purposes including irrigation of lawns and gardens
CSU Extension Provides Education

• How to **safely** use rain barrels
  • How long to store water
  • Mosquitoes
  • Water quality
  • Controlling overflow
  • Basic system components
  • Choosing a site
  • Installation
How Long to Store Water

- Rain barrels are only ecologically relevant if you USE them
- If a 1000 unit subdivision installs just one rain barrel on every home:
  - If 20% of the homeowners don’t use the barrels
  - 11,000 gallons NOT in the water cycle!
Passive Rainwater Harvesting

• Age old practice – ancient civilizations developed practices
• Earthworks – managing water where it falls or flows
• Control flood water and collect rain for ag and domestic uses
Passive Rainwater Harvesting

*(Green Infrastructure)*

• Passive water harvesting = divert water overland to vegetated areas for *immediate* use

• “*Slow it, spread it, sink it*”

• Integrated into landscape
  • Berms – *slow*
  • Swales – *spread*
  • Rain Gardens – *slow, spread and sink*
Passive Rainwater Harvesting

(Green Infrastructure)

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Passive Rainwater Harvesting

(Green Infrastructure)

- Passive water harvesting = divert water overland to vegetated areas for immediate use
- “Slow it, spread it, sink it”
- Integrated into landscape
  - Berms – slow
  - Swales – spread
  - Rain Gardens – slow, spread and sink
Rain Gardens

Use plants, soils, mulch and microbes to slow and treat stormwater runoff

• Modeled after natural ecosystems
• Keep water onsite for use AND
• Effectively reduce heavy metals, nutrients, bacteria and other pollutants AND
• Protect local streams and lakes AND
• Replenish groundwater supplies AND...what don’t they do?!
Passive Rainwater Harvesting

*(Green Infrastructure)*

- Passive water harvesting = divert water overland to vegetated areas for *immediate* use
- “*Slow it, spread it, sink it*”
- Integrated into landscape
  - Berms – *slow*
  - Swales – *spread*
  - Rain Gardens – *slow, spread and sink*
  - *Curb-cuts*
Passive Rainwater Harvesting

(\textit{Green Infrastructure})

• Passive water harvesting = divert water overland to vegetated areas for \textit{immediate} use

• “\textit{Slow it, spread it, sink it}”

• Integrated into landscape
  • Berms – \textit{slow}
  • Swales – \textit{spread}
  • Rain Gardens – \textit{slow, spread and sink}
  • \textit{Curb-cuts}
Incentives for Gray Water and Rainwater Harvesting Systems

**Tucson Water Single-Family Residential Gray Water Rebate Program**
Tucson Water will rebate one-half of qualifying gray water system costs up to $1,000 per household.

tucsonaz.gov/water/gray-water

**Rainwater Harvesting Incentives Rebate Program**
Tucson Water will rebate qualifying rainwater harvesting system costs under two levels of funding up to $2,000 per household.

tucsonaz.gov/water/rwh-rebate
Do we even get enough rain??

• The size of the roof determines how much water you will be able to harvest

\[
\text{Area of roof (feet}^2\text{)} \times \text{rainfall depth (inches)} \times 0.63 = \text{Harvested Water in gallons}
\]

40 feet long by 20 feet wide = 800 square feet of roof

\[800 \times 0.5 \times 0.63 = 252 \text{ gallons when it rains } \frac{1}{2} \text{ inch}\]
\[800 \times 0.1 \times 0.63 = 50 \text{ gallons when it rain } \frac{1}{10} \text{ inch}\]

Over the course of year = 1000s gallons!
Integrated Design – holistic approach

• A design strategy to maximize the potential of a site by creating an efficient design that saves resources and improves the function and sustainability of the site

• Create a design where all elements work together
  • Trees shade house in the summer (microclimate)
  • Runoff is captured by use of green infrastructure and waters vegetation, mitigates runoff
  • Low water use plant palette provides habitat and beauty

• Stacking functions – lighter footprint, allows us to stretch resources
Thank You

davidson@bouldercounty.org
City of Golden
Laundry-to-Landscape Ordinance

Theresa Worsham
October 20, 2020
Responsible Use
• To reduce per capita total water use by at least 15% by 2030.

Drought Planning
• To develop a resiliency plan by 2020 to prepare for a time where Golden’s and Colorado’s climate may be substantially warmer and drier than it is today.

Resource Recovery
• To develop and implement a plan by 2020 where Golden’s surplus water is used effectively.
• To recover resources from the City’s wastewater by 2030.
Past Efforts

- Conservation Goals
- Irrigation Audits
- Landscaping codes
- Building Codes
- Smart Meter infrastructure
Past Efforts

- Online water portal
- Rain barrels
- Grass-to-garden
First...
✓ Conservation
✓ Efficiency
✓ Beneficial Reuse

But now...
• Fixture types?
• Residential vs. Commercial?

Considerations:
• Administration
• Simple concept
• Conflicts with building codes
• Water rights
• Ease of adoption
• Education
Grants available!

Help with:

• Research
• Draft Ordinance
• Public Outreach
• Adoption
• Pilot projects

Next Round
Winter 2020
Pilot Projects

- Selection
- Design
- Permitting
- Construction
- Inspection
- Tracking
- Maintenance
- Case Studies
Thank You

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sustainability

Waternow Alliance
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www.waternow.org
Discussion and Questions?

• Please type your questions into the Q&A box. We will get to as many questions from attendees as we can.

• Thank you to our speakers today!

• Join us this Thursday for “Introduction to landscape and irrigation certification programs in Colorado” at 1 p.m.