



**CLEAResult**

# Hot Water Recycling or Grey Water Heat

There Are Options!

James Domanski

Kaity Tang

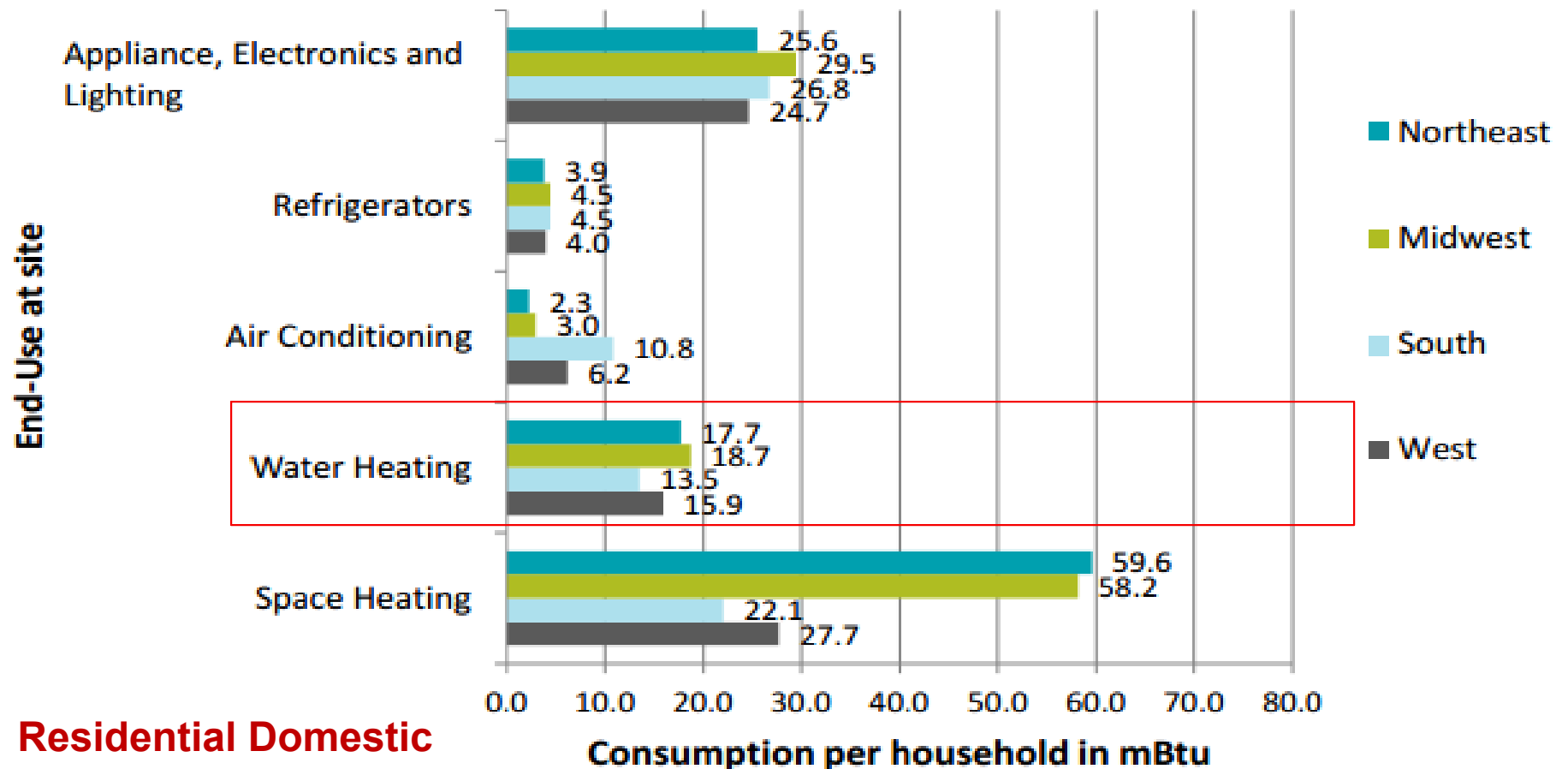
We change the way people use energy™

# Agenda

- The Issue
- The Options
- The Results

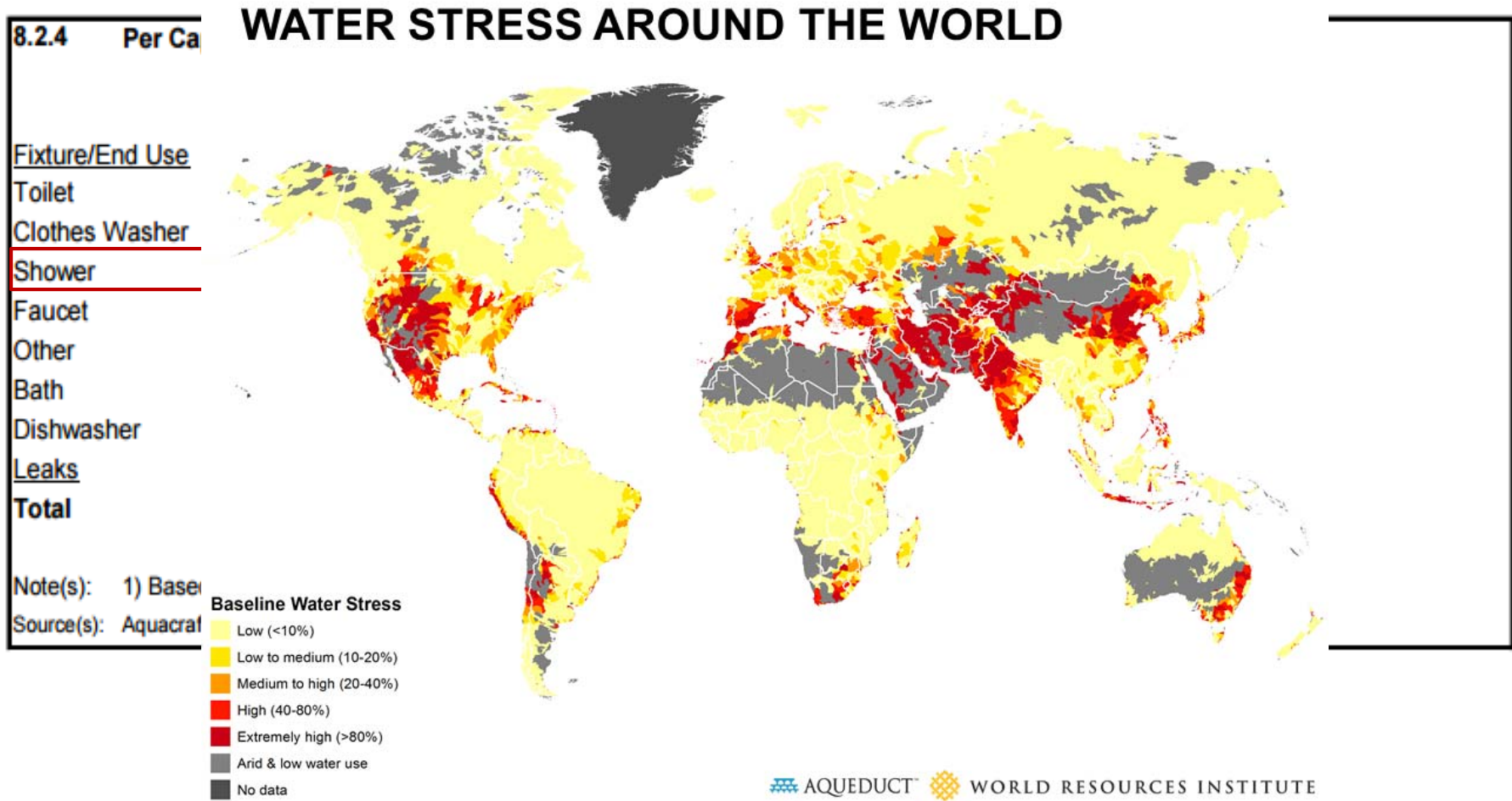
# Energy Usage by End Use

## Household Site End-Use Consumption by Region



**Residential Domestic  
Water Heating Energy  
Use ~18%**

# Water Usage by End Use



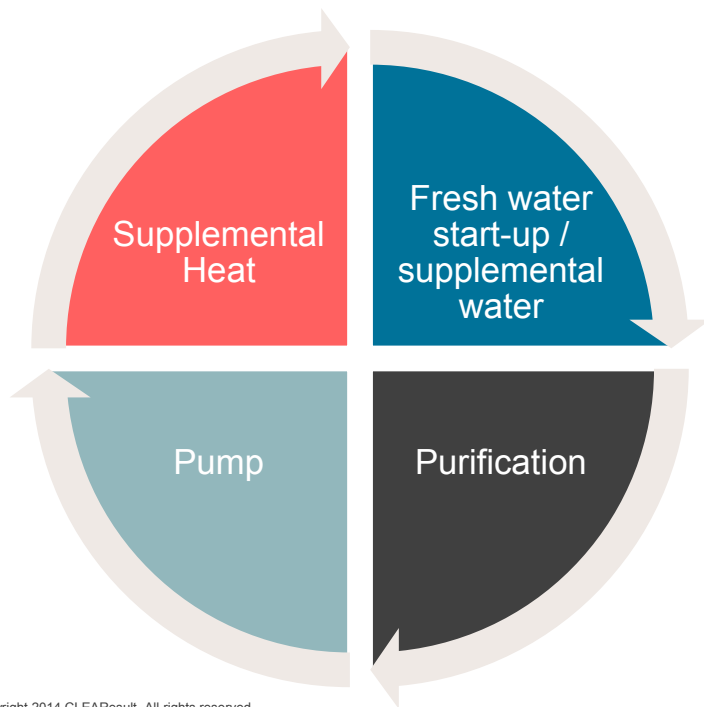
## ▲ The Options

---

- Shower Recycling
  - Built-in water treatment
  - New application for indoor water re-use
  - Easier retrofit application
- Whole Home Water Recycling
  - Larger waste heat and gray-water re-use potential
  - Indoor and outdoor water re-use applications

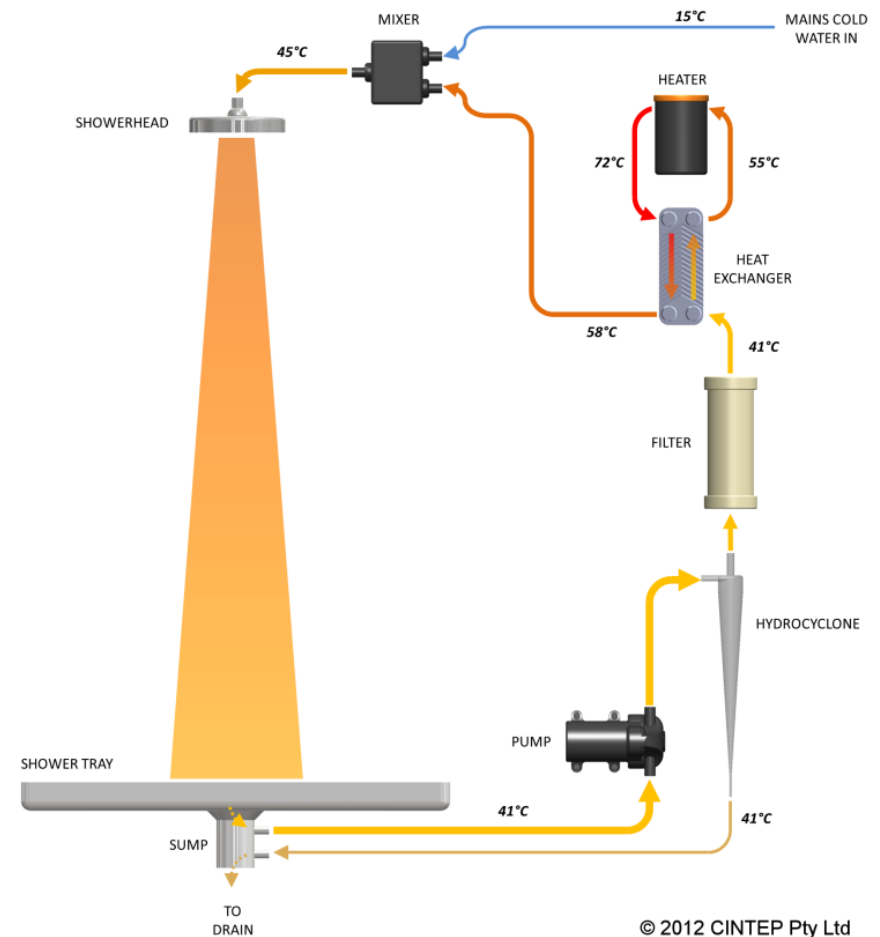
## ▲ In Shower Recycling

- Shower recycling
  - Manufacturer claims:
    - ~80-90% water savings
  - \$3,000-\$5,000



## ▲ In Shower Recycling

- 3-step filter process + pasteurization
- Cold water line connection
- 0.8 gal fresh on startup



## ▲ In Shower Recycling

- Micro + nano purification capsule filters
- Contamination concentration sensor
- Higher flow at shower head
- 1.3 gal startup

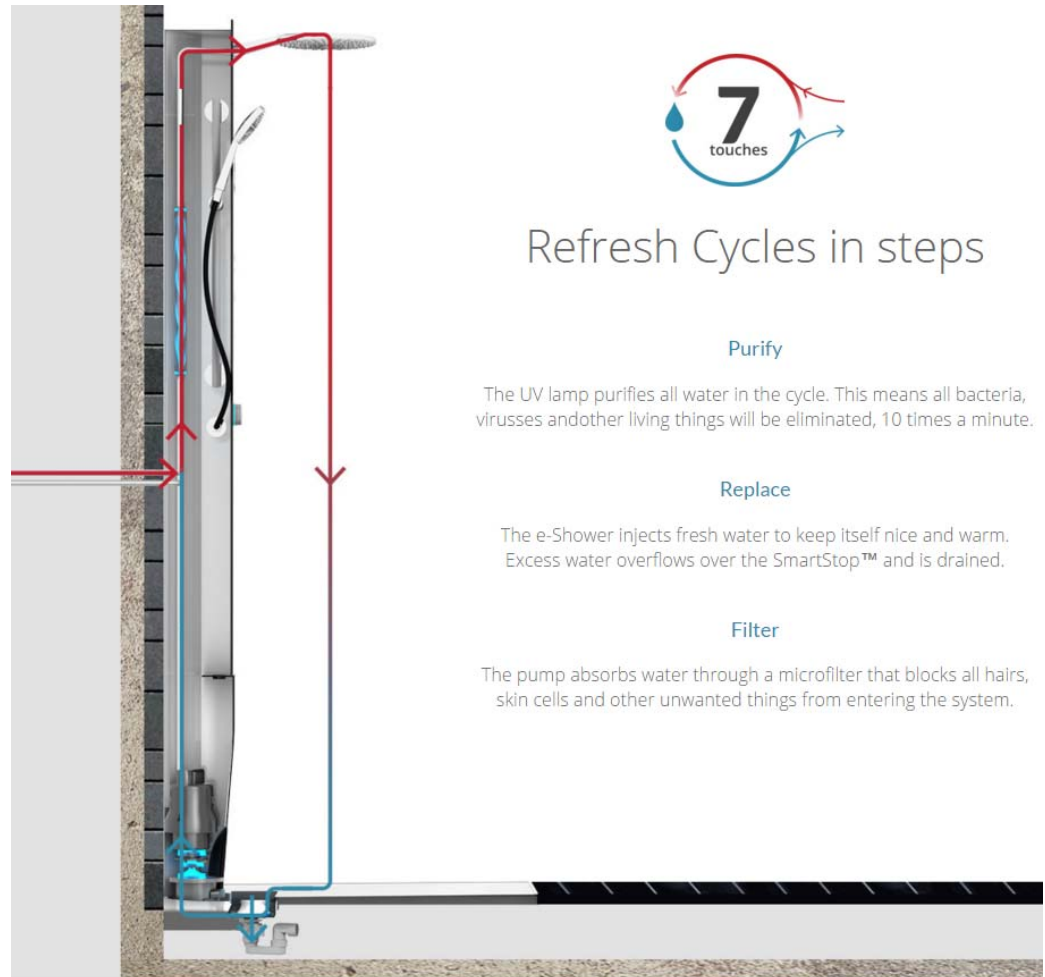


<https://orbital-systems.com>



## ▲ In Shower Recycling

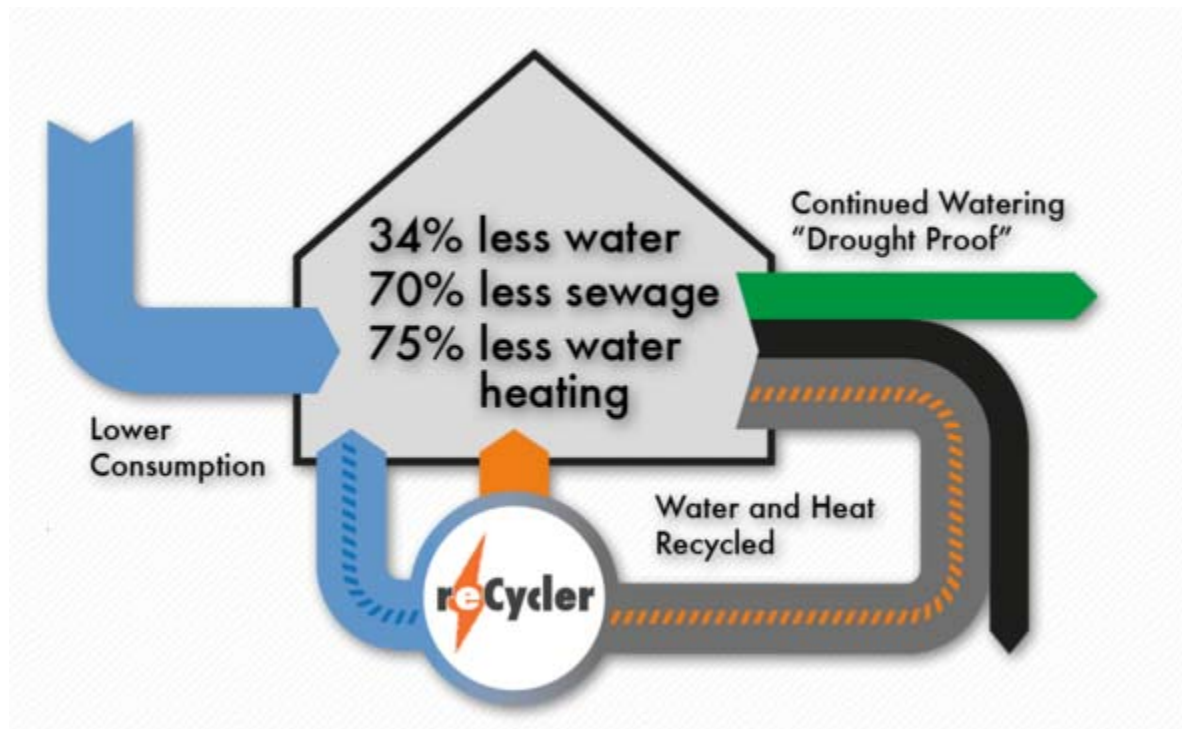
- UV lamp + filter
- 0.8 gal start-up
- Higher flow at shower head
- No built-in heater
  - Rely on incoming hot water line



<https://www.hamwells.com/refresh-cycles>

## ▲ Nexus eWater

---

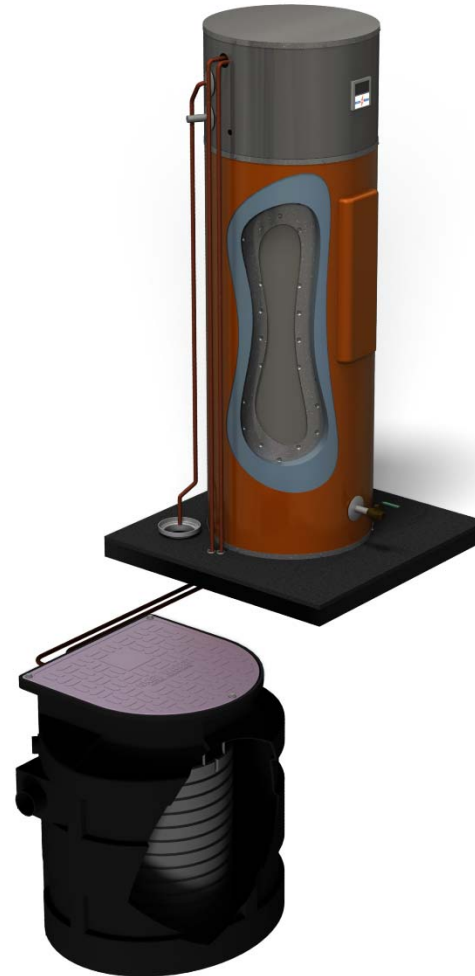


## ▲ Nexus eWater

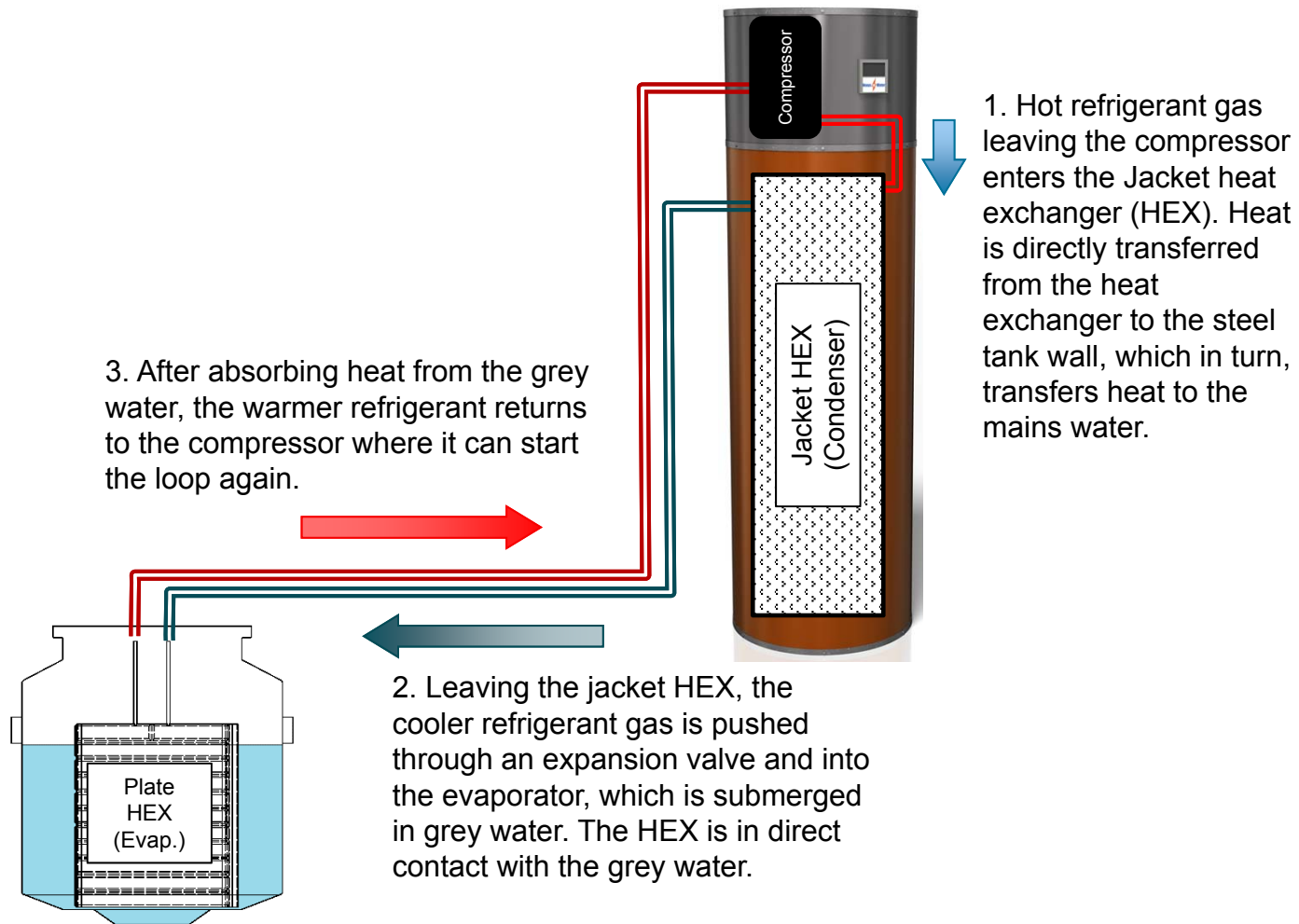
---

# **NEX** heater

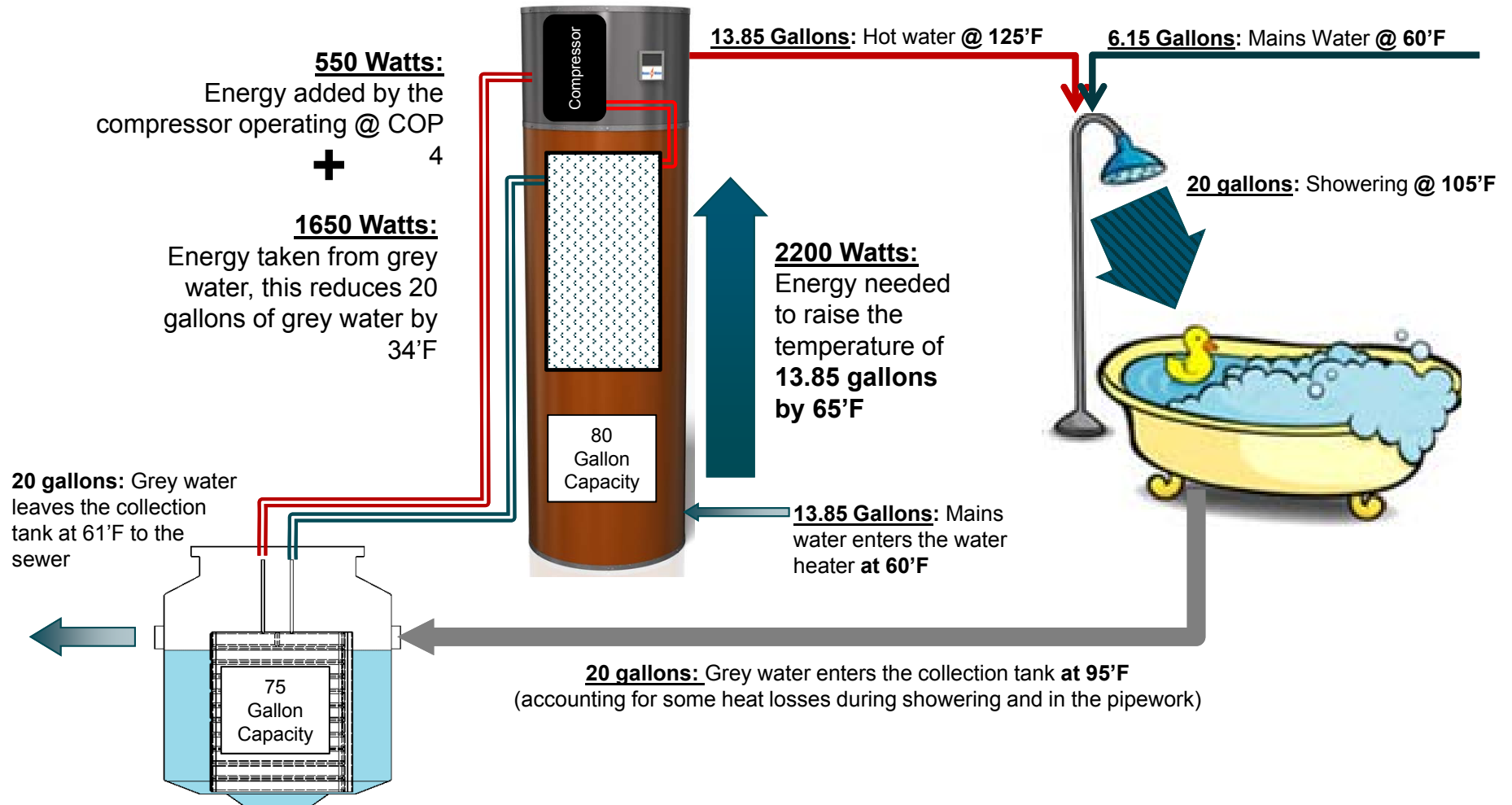
- Efficiency
  - COP 4+
  - EF – TBD
  - FHR – TBD
- Storage Capacity
  - 80 gallons
- HP Heating Capacity
  - 3160w (Average)
  - Input Power – 400-790w
  - Electric Resistance
  - 2500w



# How it Works (Heat Loop)

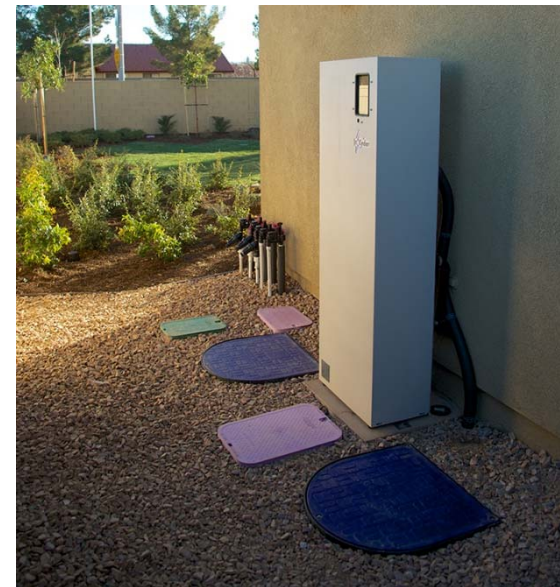


# How it Works (Energy Balance)



## Early Applications

- Several sites: Northern California, UC Davis, Sea Cliff
  - Currently data is not readily available, but is being gathered
- Northern California Home
  - Sporadic information because it is not regularly occupied
  - NEXheater and whole eWater system
- UC Davis Solar Decathlon Home
  - Still in the gathering process
  - NEXheater and whole eWater system
  - Additionally grant applications like UC Davis coming in now and projects will continue to have installations throughout the year
- Sea Cliff homes are being sold to new occupants



## ▲ Early Applications

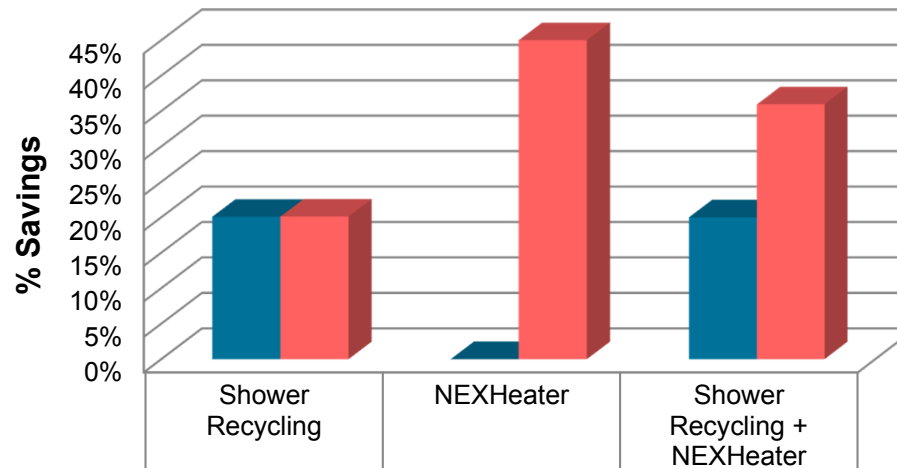
---

- Mostly new construction but they are moving into some retrofit applications this year
  - Next May there will be more substantive data at that point.
- New as of 2/22/2016
  - Gary McDonald homes will be installing the nexus systems in their new development in Fresno
  - 44 homes
  - 12 will have the full system
  - 32 will be recycle ready and have a system purchase cost of \$7,500



# Estimated Impacts

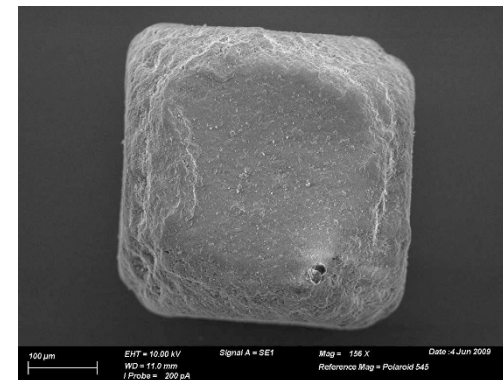
## Combined Effects on Estimated Total Household Hot Water Savings



■ Total Household Hot Water Savings	20%	0%	20%
■ Total Household Hot Water Energy Savings	20%	45%	36%



- \*Based off of manufacturer's claims of 80% water savings based
  - Does not account for pump, backup heating
- \*\*Assuming COP of 4









# Thank You