DOCKETED

Docket Number:	15-WATER-03
Project Title:	Water Energy Appliance Rebate Program
TN #:	204747
Document Title:	RICHARD W NIELSEN Comments: WATER/ENERGY EFFICIENCY and LIFESTYLE COMPATIBILITY OF HOT WATER RECIRCULATION PUMPS IN REBATE PROGRAM
Description:	N/A
Filer:	System
Organization:	RICHARD W NIELSEN
Submitter Role:	Public
Submission Date:	5/27/2015 4:33:57 PM
Docketed Date:	5/27/2015

Comment Received From: RICHARD W NIELSEN
Submitted On: 5/27/2015
Docket Number: 15-WATER-03

WATER/ENERGY EFFICIENCY and LIFESTYLE COMPATIBILITY OF HOT WATER RECIRCULATION PUMPS IN REBATE PROGRAM

Additional submitted attachment is included below.

Docket: 15-WATER-03

Docket Number: 15-WATER-03
Project Title: Water Energy Appliance Rebate Program

Document Title: Richard Nielsen Comments: WATER/ENERGY EFFICIENCY and LIFESTYLE COMPATIBILITY OF HOT WATER RECIRCULATION PUMPS IN REBATE PROGRAM

Submitter Role: PUBLIC
Submission Date: 05-27-2015

WHY ^ HOT WATER RE-CIRCULATORS?

EFFICIENT

1. **MOST EVERYBODY WAITS FOR HOT WATER**
   - BIGGEST IMPACT / EFFECT

2. **WATER WOULD BE SAVED MULTIPLE TIMES DAILY**
   - DAILY SAVINGS (NOT ONLY ON LAUNDRY DAY)
   - AFFECTS THOSE WHO USE LAUNDRY MATS

3. **REDUCES OVERLOAD, AGED WATER DISTRIBUTION SYSTEM**
   - LOAD REDUCTION DURING PEAK USAGE TIMES
   - FEWER BURST UNDERGROUND PIPES; WATER SAVED
   - FEWER HIDDEN LEAKING UNDERGROUND PIPES

4. BENEFITS TO WASTE WATER TREATMENT PLANTS

LESS CLEAN POTABLE WATER TO REMOVE FROM WWTF

- SAVINGS:
  - ✓ ENERGY; Less pumping / processing
  - ✓ REDUCED CHEMICALS CONSUMPTION
  - ✓ REDUCED MAINTENANCE
  - ✓ REDUCED LABOR / MANHOURS
- EXTENDS TREATMENT PLANT POPULATION CAPACITY
- EXTENDS TREATMENT PLANT LIFESPAN
  (Potential for Billions $ Postponed Build / Upgrade)

I WISH TO CONVEY TO THE COMMISSION

1. **Waiting for hot water at sinks and showers is the biggest "WASTE" of water resources in California .**

2. **I STRONGLY FAVOR, "Water-Efficient" Hot Water Re-circulators in the rebate program.**

3. **I STRONGLY OPPOSE, "Water-Inefficient" Hot Water Re-Circulators which utilize Normally Open Thermostatic Sensor Valves.** Since it's proven using these types of systems result in the cold water line(s) filling with 90F- 80F degree water anytime the system is operating. This results in **gross energy waste** and users **wasting water down the drain waiting for cold water** out their faucet. This totally defeats the purpose of this rebate program. (See Fig "A" and "B")

Fig. A

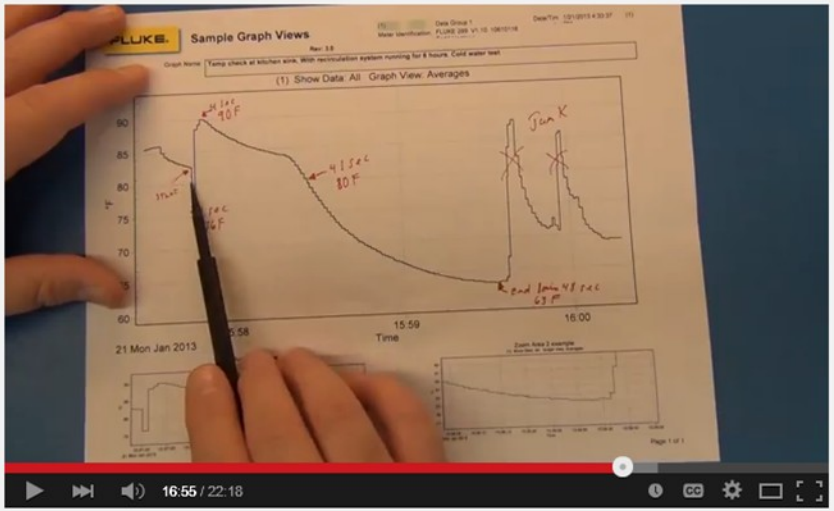
NORMALLY OPEN THERMOSTATIC SENSING VALVE

https://youtu.be/KKKX3KCZaOw?t=8m12s

Fig. B

PROOF OF WATER-INEFFICIENCY LONG WAIT TIMES FOR COLD WATER

https://youtu.be/KKKX3KCZaOw?t=16m55s



VIDEO'S CAN BE VIEWED ON YOUTUBE AT LINKS SHOWN ABOVE IMAGES

MORE THOROUGH UNDERSTANDING ILLUSTRATED AT BELOW LINK

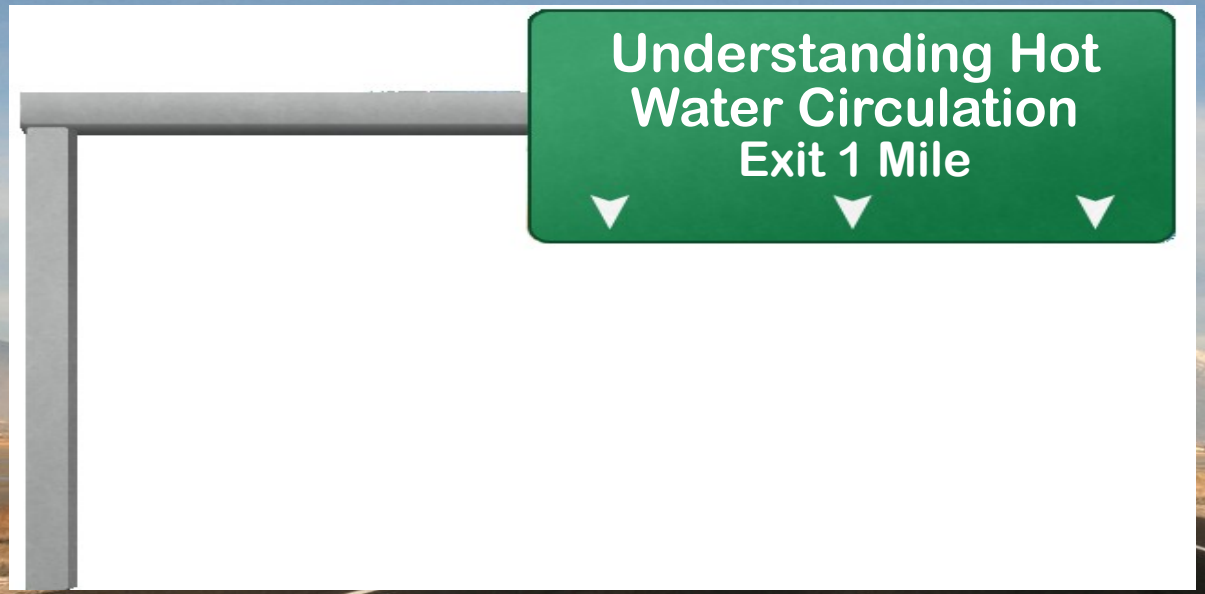
http://www.redytemp.com/hotwatercirculatorproblems.php

I WISH TO CONVEY TO THE COMMISSION cont.

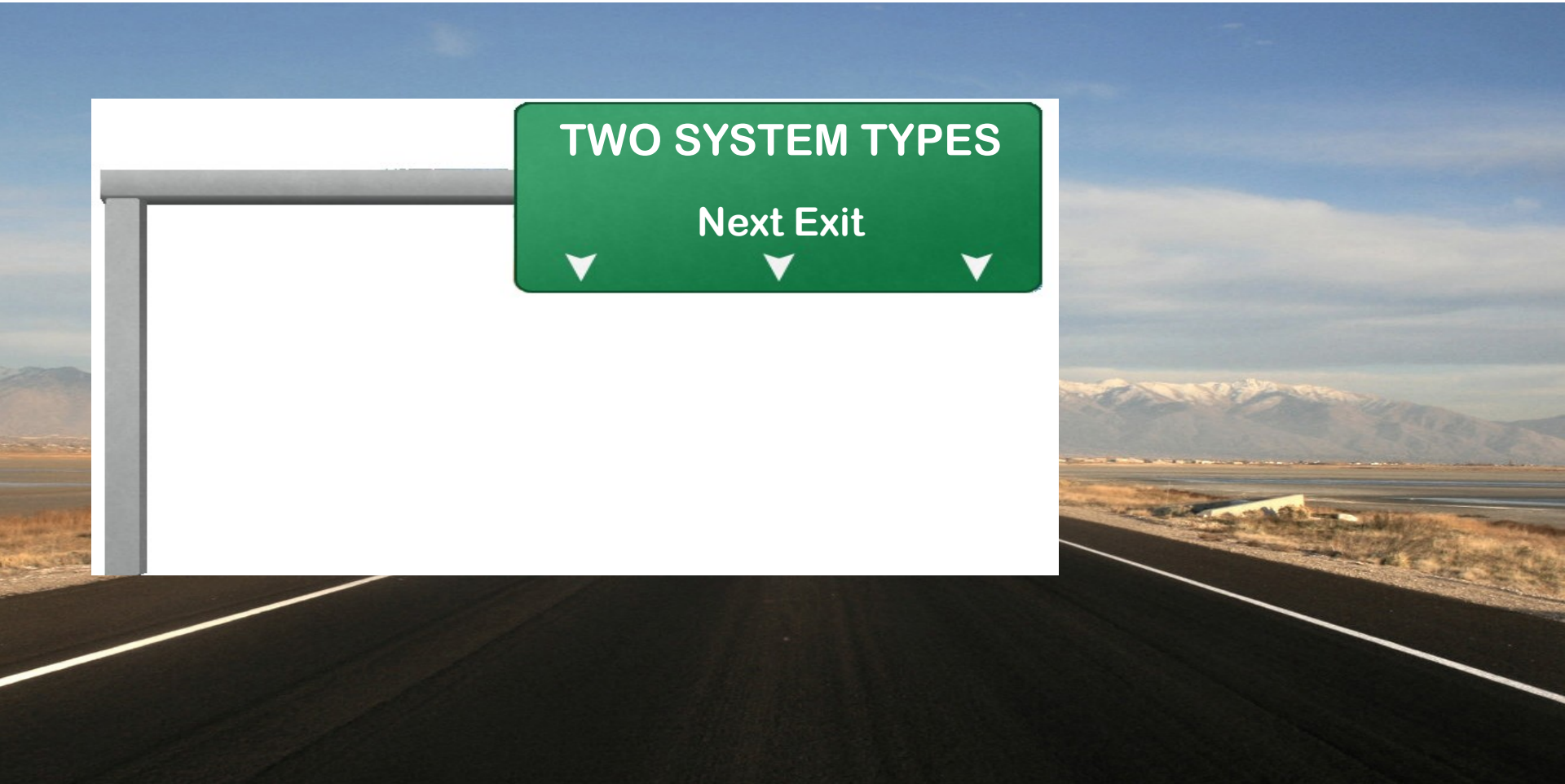
4. **STRONGLY RECOMMEND that the qualifying circulators have both SCHEDULED/TIMER MODES and ON-DEMAND MODE activation capabilities.**

   A TIMER controlled hot water circulator is of no use to a household that lives a busy lifestyle where the occupants are NOT routinely home during specific hours.

Common Sense Guide to Hot Water Circulation

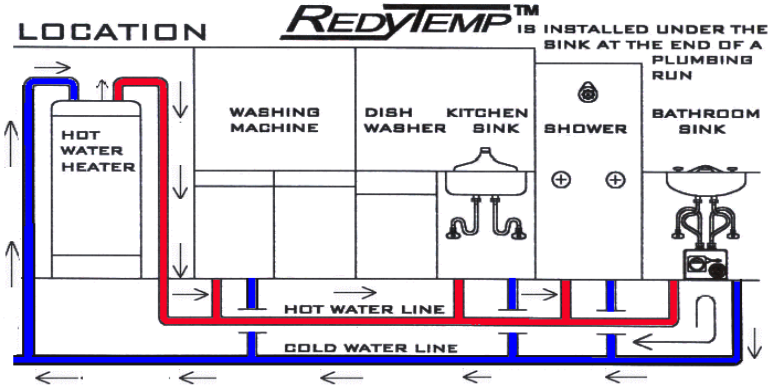


Common Sense Guide to Hot Water Circulation

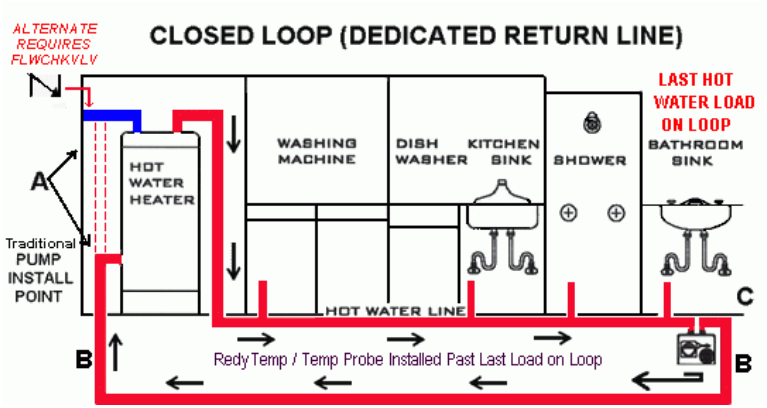


HOT WATER CIRCULATION SYSTEM TYPES

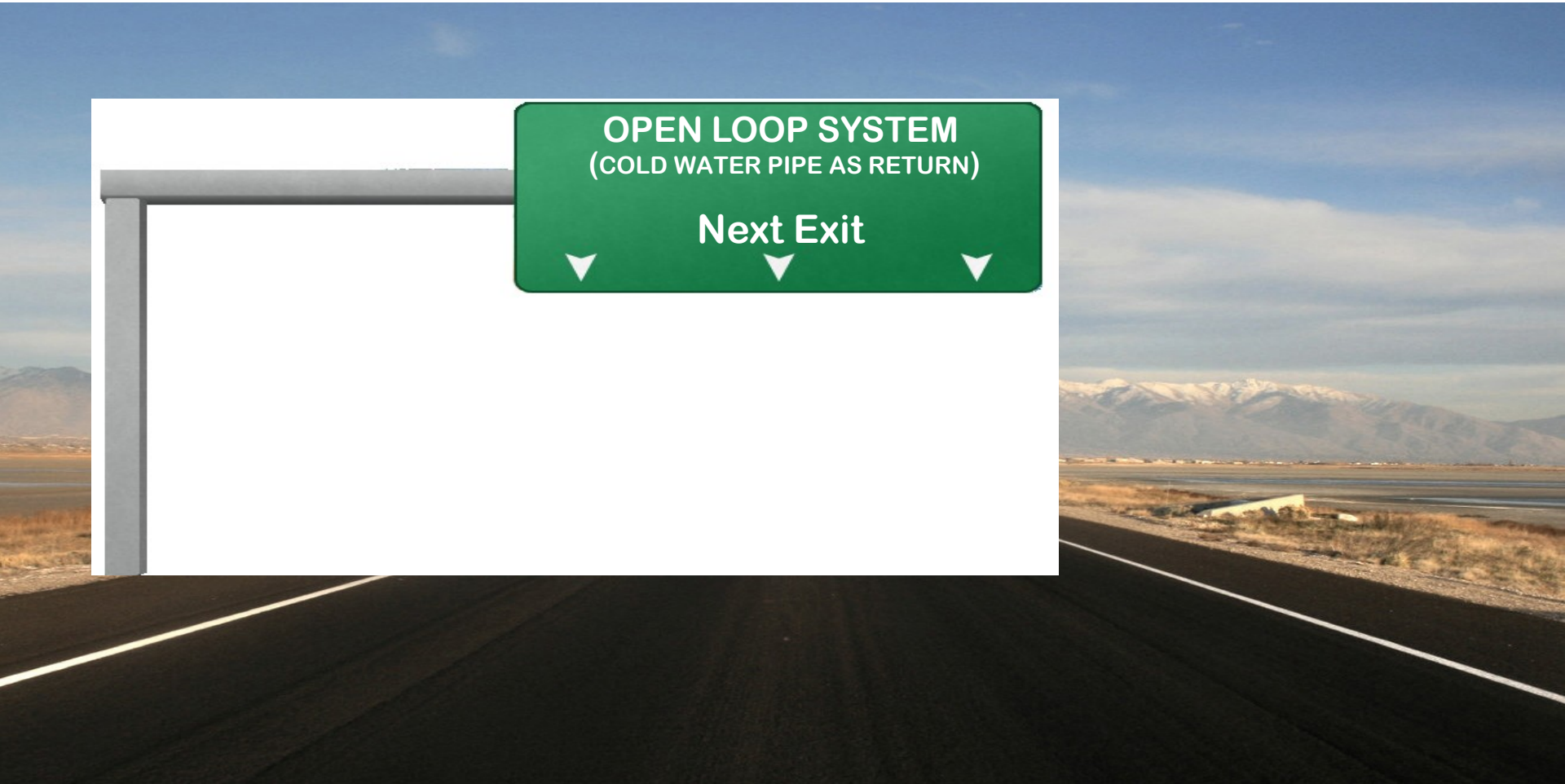
OPEN LOOP SYSTEMS UTILIZES HOMES **COLD WATER LINE** TO RETURN WATER BACK TO WATER HEATER. TYPICALLY INSTALLED AFTER HOME WAS BUILT.



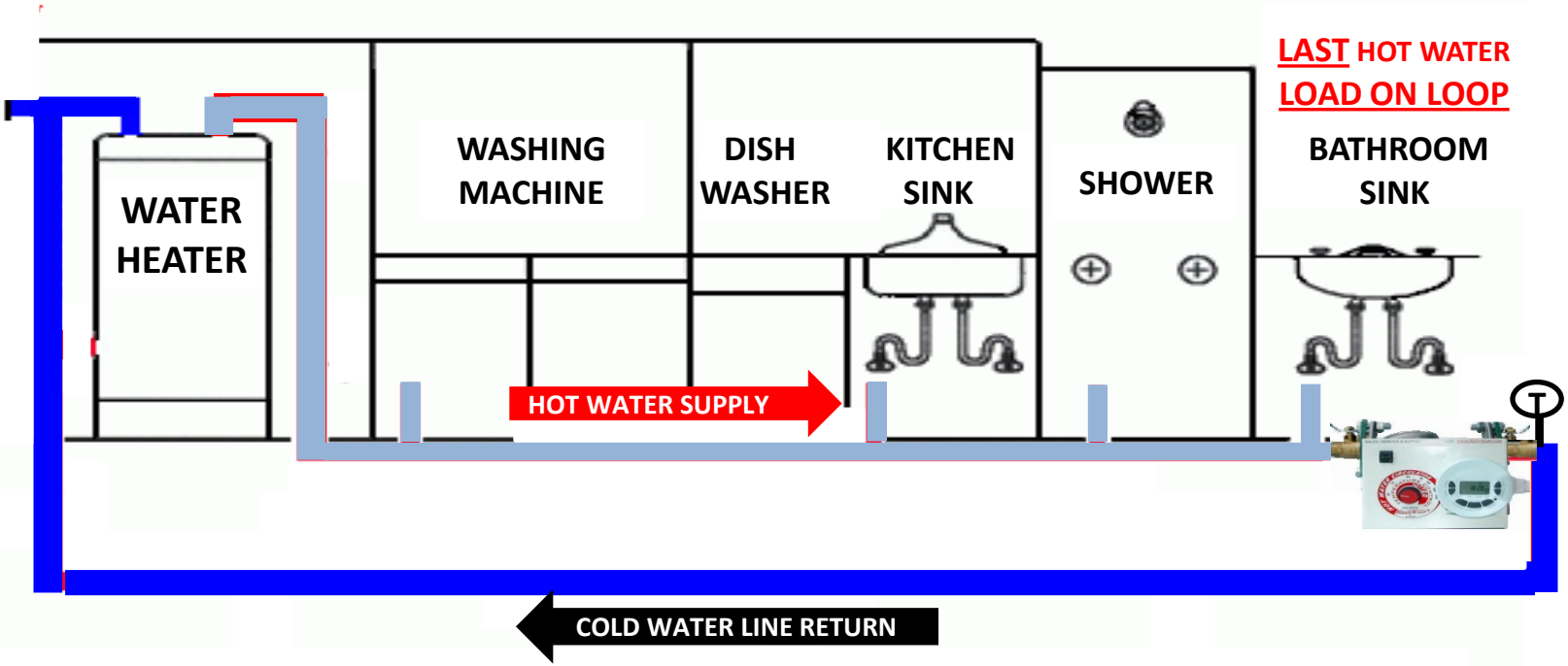
CLOSED LOOP SYSTEMS UTILIZES **DEDICATED HOT WATER PIPE / LOOP** THAT LEAVES WATER HEATER AND RETURNS TO WATER HEATER. TYPICALLY INSTALLED WHEN HOME IS BUILT.



Common Sense Guide to Hot Water Circulation

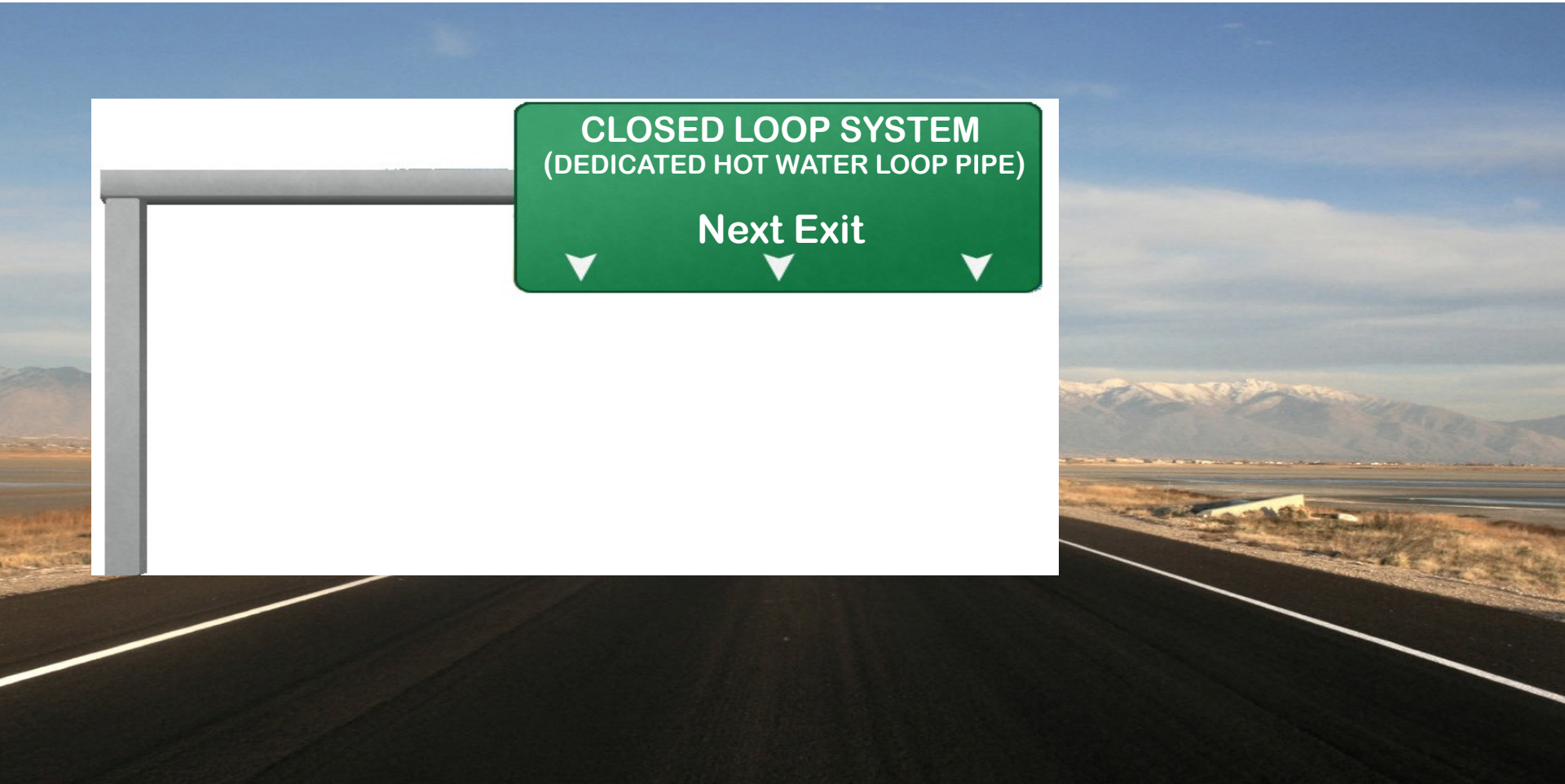


OPEN LOOP (COLD LINE AS RETURN LINE)

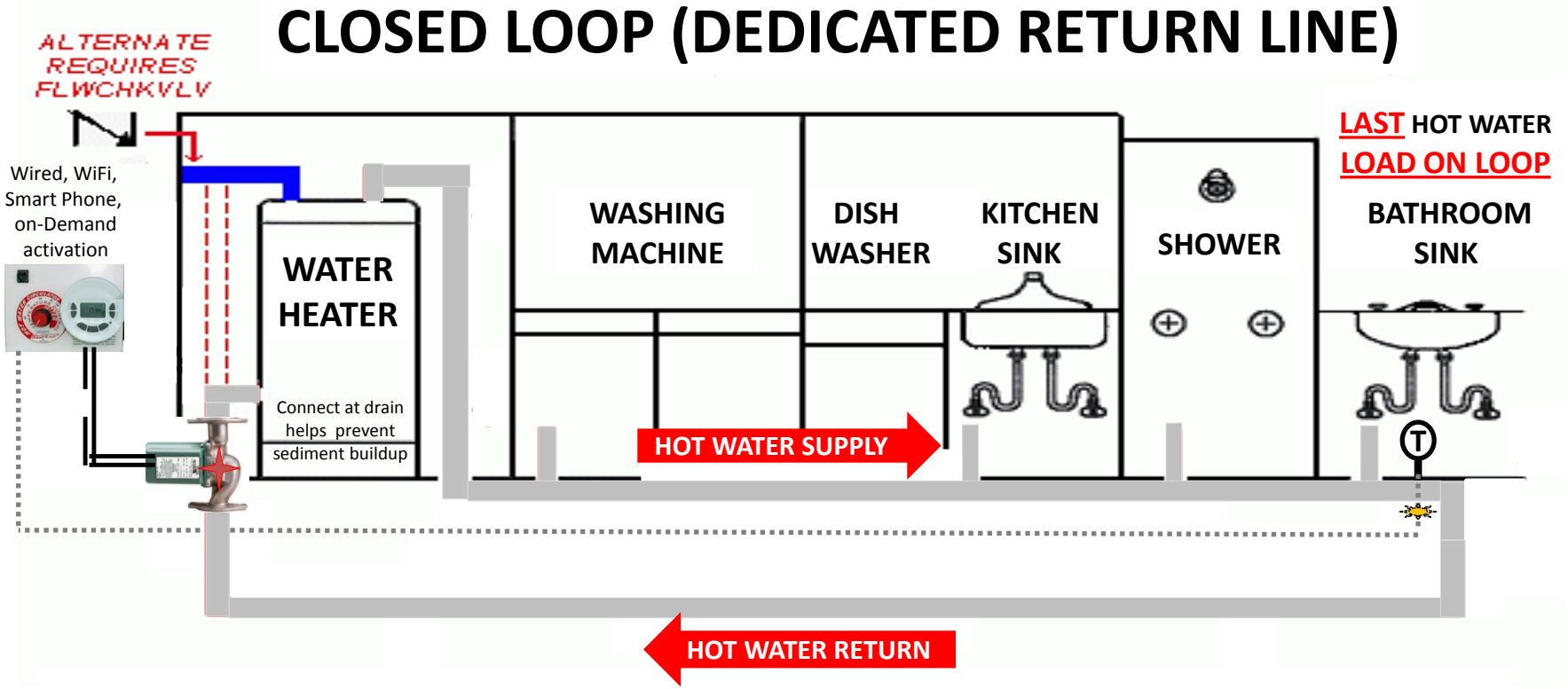


CIRCULATION PUMP, CONTROLLER and **THERMO-SENSOR** installed at **END** of **HOT WATER SUPPLY** portion of loop

Common Sense Guide to Hot Water Circulation



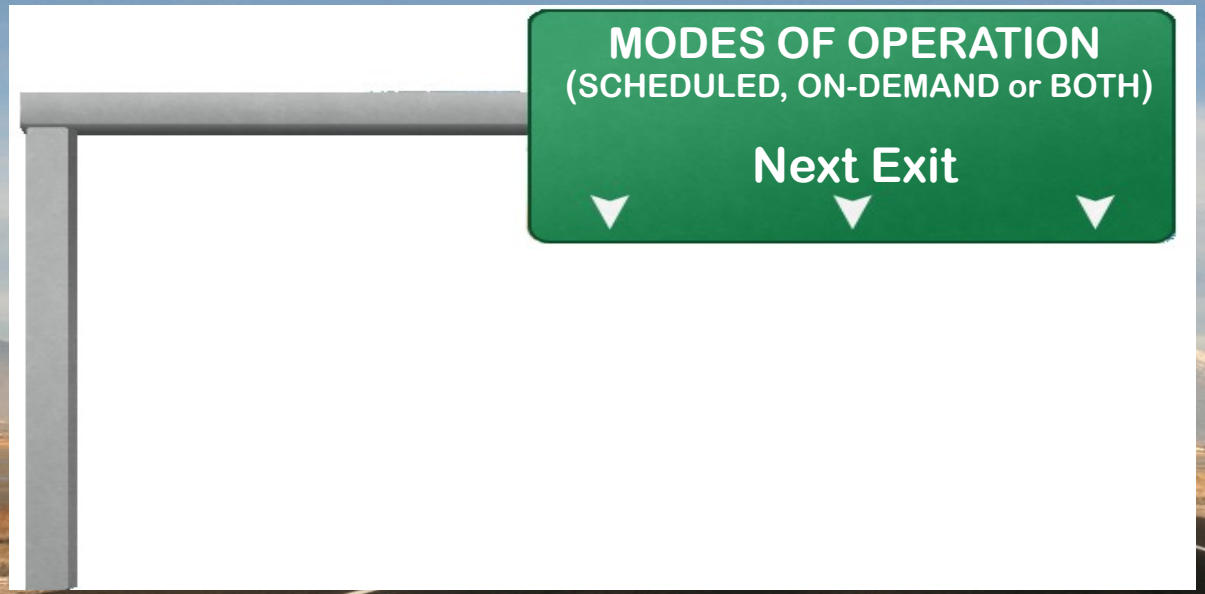
CLOSED LOOP (DEDICATED RETURN LINE)



CIRCULATION PUMP and **CONTROLLER** installed at water heater.

THERMO-SENSOR is installed at **END** of **HOT WATER SUPPLY** portion of loop.

Common Sense Guide to Hot Water Circulation



OPERATING MODES

BASED ON SCHEDULE HOUSEHOLDS WITH ROUTINE LIFESTYLE

- UTILIZES A **TIMER** TIME-OF-DAY SCHEDULE CHOSEN BY HOMEOWNER.

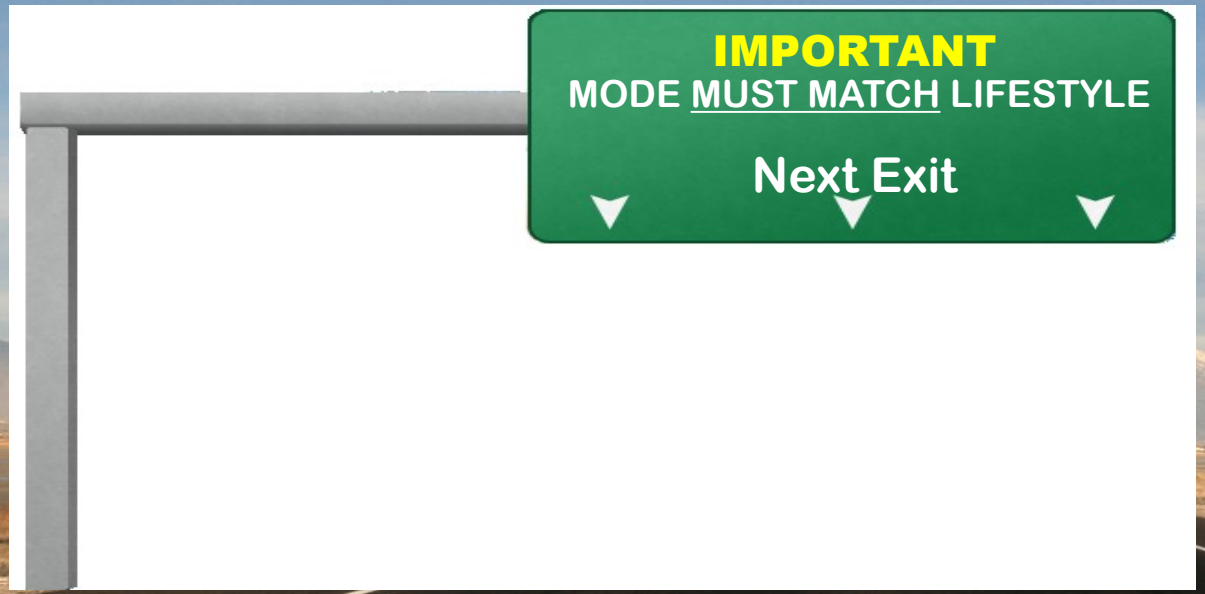
ON-DEMAND HOUSEHOLDS WITH BUSY LIFESTYLE

- UTILIZES **PUSH-BUTTON** OR OCCUPANCY SENSOR TO ACTIVATE SYSTEM. SINGLE-CYCLE ACTIVATION. PUMPING STOPS WHEN HOT WATER REACHES TEMPERATURE SENSOR

SIMULTANEOUS SCHEDULED & ON-DEMAND OCCUPANTS LIVING MIXED LIFESTYLE

- OPERATES ON EITHER **TIMED** OR **PUSH-BUTTON** OR **BOTH TYPES SIMULTANEOUSLY.** **ReadyTemp** is only system with both capabilities.

Common Sense Guide to Hot Water Circulation



IMPORTANT

MAX SAVINGS = MODE MATCHES LIFESTYLE

MIN SAVINGS = MODE DOES NOT MATCH LIFESTYLE

DOCTORS, FIREMAN, POLICEMAN, ARE OCCUPATIONS IN WHICH THE PERSON IS NOT ROUTINELY AT HOME DURING SPECIFIC HOURS. THUS, A PUSH-BUTTON ACTIVATED ON-DEMAND HOT WATER CIRCULATOR WOULD BE COMPATIBLE.

HOUSEHOLDS WHERE OCCUPANTS LIVE A ROUTINE LIFESTYLE, A TIMER BASED HOT WATER CIRCULAR WOULD BE MORE PRACTICAL.

HOUSEHOLDS WHERE MIXED LIFESTYLES RESIDE WOULD REQUIRE A SYSTEM WITH BOTH TIMED AND PUSH-BUTTON CAPABILITIES.

Common Sense Guide to Hot Water Circulation

AVOID COSTLY INEFFICIENT CONTROL

- **THERMOSTATIC VALVE SYSTEMS;**
  - RESULT IN LONG WAITS FOR COLD WATER
  - UTILIZE CONTINUOUS RUNNING PUMPS
  - ONLY FUNCTION IN TIMER MODE (INCOMPATIBLE WITH BUSY LIFESTYLES)

- **SYSTEMS WITHOUT 2-WAY FLOW CONTROL;**
  - COLD WATER USE PLACES DEMAND ON WATER HEATER

HOT WATER CIRCULATING SYSTEM

THE FOLLOWING SLIDES ARE MEANT TO CONVEY

PUMP OPERATIONS and DEMAND

CONTINUOUS PUMPING IS INEFFICIENT AND MAXIMIZES DEMAND

CYCLIC-PUMPING MINIMIZES PUMPING…MINIMAL DEMAND

TODAY'S PUMPS ARE HIGH EFFICIENCY

Today's pumps consume very little energy during operation.

CONTINUOUS VS CYCLIC PUMPING

(17 HRS/DAY OF HOT WATER READINESS)

40 Watt Pump at $0.10 per kWh*	CONTINUOUS PUMP RUNTIME (hrs)	ELECTRIC POWER*	CYCLIC PUMP RUNTIME	ELECTRIC POWER*
Daily	17	$0.068	2.8	$0.011
Monthly	510	$2.04	85	$0.93
Annually	6,205	**$24.82**	1,033	**$4.02**

Pump Energy Cost

CONTINUOUS PUMPING = CONTINUOUS WATER HEATER DEMAND

PUMP RUNTIMES (17 HRS/DAY)

40 Watt Pump at $0.10 per kWh*	CONTINUOUS PUMP RUNTIME (hrs)	ELECTRIC POWER*	CYCLIC PUMP RUNTIME	ELECTRIC POWER*
Daily	17	$0.068	2.8	$0.011
Monthly	510	$2.04	85	$0.93
Annually	**6,205**	$24.82	1,033	$4.02

Water Heating Cost

6,205 hours of water continuously passing through the water heater.

TEMPERATURE-BASED CYCLIC PUMPING

Minimizing pump operations based on **temperature** and **time** reduces demand and extends component life. When temperature is a controlling factor, pump operations are **disabled when hot water exists in the loop** / during hot water usage. 17 hours of hot water readiness.

PUMP RUNTIME COMPARISON
(17 HRS/DAY OF HOT WATER READINESS)

	CONTINUOUS PUMPING	CYCLIC PUMPING*
Daily	17	2.8
Monthly	510	85
Annually	6,205	**1,033**

Assumed Cyclic Interval

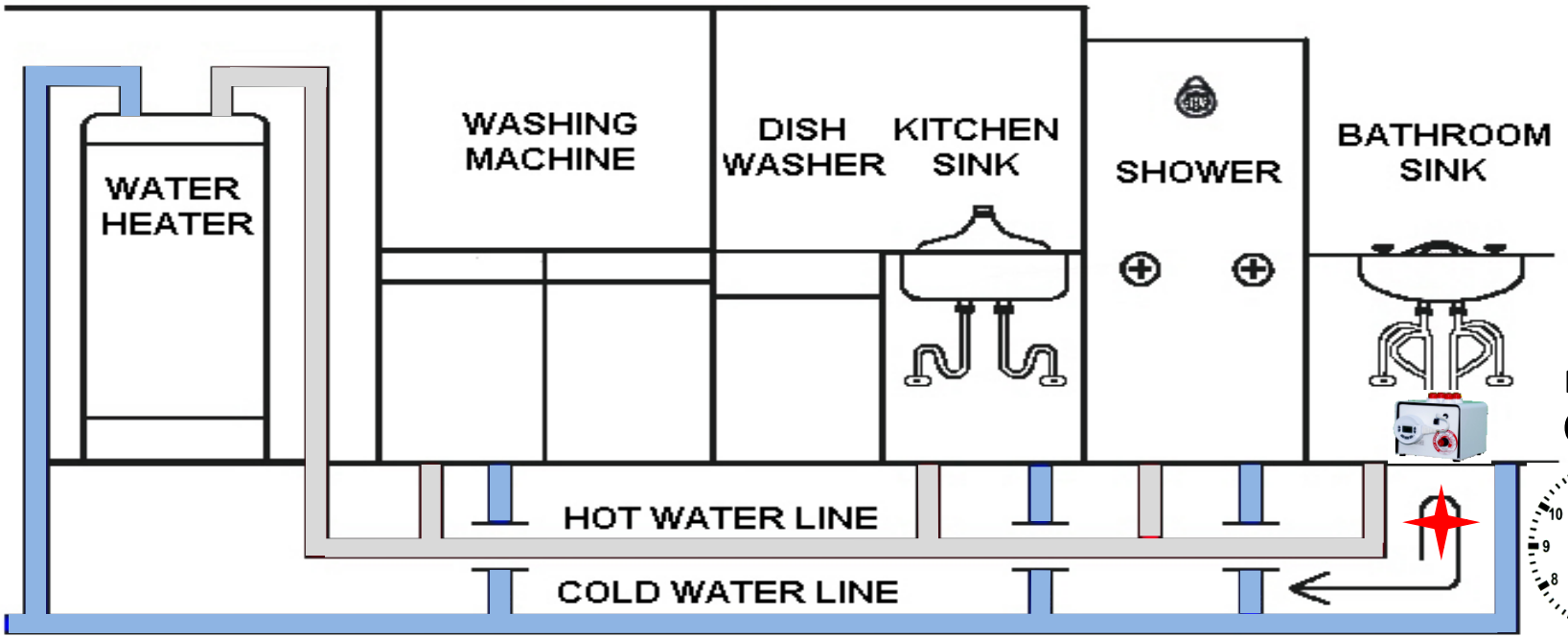
"ON" 1 min / "OFF" 5 min = 10 minutes / hour x 17 hrs

***Cyclic-pumping** total **does not** include times when hot water exist in pipes preventing pump operations.

***84%** **Less Pump Demand**

EFFICIENT HOT WATER CIRCULATION

Temperature-Based *Cyclic*-Pumping



PUMP **OFF**

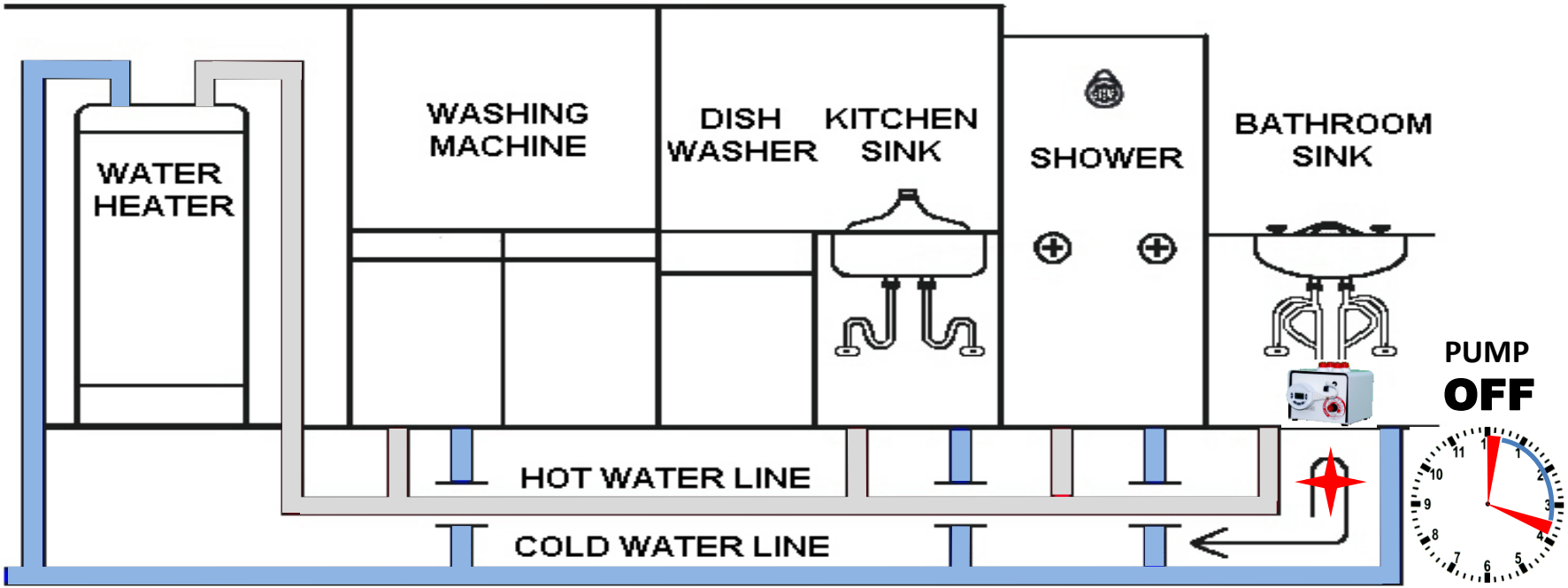
RUNTIME

Active=RED

Idle=BLUE

PUMPING STARTS BASED ON MODE (TIMER / PUSH-BUTTON)
PUMPING STOPS WHEN WATER TEMP = CHOSEN SETPOINT.

IN TIMER MODE AND TEMPERATURE FALLS BELOW CHOSEN SETPOINT
PROCESS REPEATS OR WHEVER BUTTON IS PRESSED IN ON-DEMAND MODE



MINIMAL PUMPING = MINIMAL DEMAND ON WATER HEATER

(AND MINIMAL LOSS OF COLD WATER COMFORT)

MAXIMIZING EFFECT

- **INITIAL REBATES TO VERIFIED LARGE HOMES OR HOMES WITH 2 OR 3 FLOORS**(UPSTAIRS MASTER BATH 2-3 MINUTE WAIT IS COMMON)

- **REQUIRE CONVENIENT HOT WATER IN ESTABLISHMENTS WITH HEAVY RESTROOM TRAFFIC** (RESTAURANTS, FAST FOOD CHAINS, BOWLING ALLEY, SPORTS ARENA, GYM, TRUCK STOPS, MEDICAL FACILITIES, THEATERS, ETC)

ADDITIONAL ONLINE RESOURCES

THESE ONLINE CALCULATORS MAY BE OF ASSISTANCE IN CONSIDERATION OF THE REBATE PROGRAM

ONLINE POPULATION-BASED
WATER / RESOURCE SAVINGS CALCULATOR

LINK SOURCE: http://www.redytemp.com/waterrebateanalysis.htm

Ask area utility providers for accurate cost factors

CENSUS or USER SUPPLIED DATA

City or Territory:	CALIFORNIA
Population:	38,668,076
# of Households:	12,542,460
Avg Persons Per Hm:	2.94

LOCAL AREA COST FACTORS

Cost $ Per Acre-Foot Water:	520.00
kWh to Convey 1 Acre-Foot Water:	3,169.6
Cost $ Per kWh:	0.124
Cost $ Treat Acre-Foot WasteWater:	550.00

% Population in Calc: 25%

Daily Water to Save Per Person 1 **Gal Per Day**

	SAVED RESOURCES				AVOIDED COST			TOTAL$
	Water (MILLIONS GAL)	Acre-foot	kWh/Convey	Tons CO2	Water	Energy	Wastewater Treatment	
DAILY	10	29.7	94,032	25	$15,427	$11,660	$16,317	$43,404
MONTHLY	294	902	2,860,155	749	$469,233	$354,659	$496,304	$1,320,196
YEARLY	3,528	10,828	34,321,862	8,992	$5,630,795	$4,255,911	$5,955,649	$15,842,355
5 YEARS	17,642	54,142	171,609,308	44,962	$28,153,975	$21,279,554	$29,778,243	$79,211,773

ONLINE WATER REBATE PROGRAM PAYBACK CALCULATOR

LINK SOURCE: http://www.redytemp.com/waterrebateanalysis.htm

DEVICE TO REBATE	(Solenoid-Based)Hot Water Optimizer				
% H.holds to Calc:	20%				
# Household / Rebates	2,508,492				
Rebate $ Amount	25.00	50.00	75.00	100.00	
Total Rebate Credits	$62,712,300	$125,424,600	$188,136,900	$250,849,200	
Payback From Savings (years)	0.56	1.11	1.67	2.23	LOW
	0.37	0.74	1.11	1.48	MEDIUM
	0.28	0.56	0.84	1.11	HIGH

Provide ESTIMATED ANNUAL WATER SAVINGS PER HOME(Gallons)

LOW estimate	10,000
MEDIUM estimate	15,000
HIGH estimate	20,000

ESTIMATED POTENTIAL SAVINGS and CARBON CREDITS

		SAVED RESOURCES			CREDITS	AVOIDED COSTS			TOTAL
		Water (BILLIONS GALLONS)	Acre-foot	kWh/Convey	Tons CO2	Water	Energy	Wastewater TREATMENT	
1st YEAR	LOW	25.08	76,983	244,004,660	63,929	$40,031,052	$30,256,578	$42,340,536	$112,628,166
	MED	37.63	115,474	366,006,990	95,894	$60,046,578	$45,384,867	$63,510,804	$168,942,249
	HIGH	50.17	153,966	488,009,320	127,858	$80,062,104	$60,513,156	$84,681,072	$225,256,332
2nd YEAR	LOW	50.17	153,966	488,009,320	127,858	$80,062,104	$60,513,156	$84,681,072	$225,256,332
	MED	75.25	230,948	732,013,980	191,788	$120,093,157	$90,769,733	$127,021,608	$337,884,498
	HIGH	100.34	307,931	976,018,640	255,717	$160,124,209	$121,026,311	$169,362,144	$450,512,664

TIME AND WATER SAVINGS CALCULATOR

LINK SOURCE http://www.redytemp.com/instanthotwatersavingscalculator.htm

TIME AND WATER SAVINGS CALCULATOR

In the YELLOW cells enter the number of occurences per-day an occupant(s) wait for hot water corresponding to the PINK cell matching the seconds they wait. For example, 9 men exercise and take showers at different times an wait 30 seconds each, put a "9" in 1st event column/ row "30" Use TAB key to navigate between cells.

WAIT (sec)	1st HW event	2nd HW event	3rd HW event	4th HW event	5th HW event	6th HW event	# HW EVENTS
15							0.0
30							0.0
45							0.0
60							0.0
75							0.0
90							0.0
105							0.0
120							0.0
135							0.0
150							0.0
165							0.0
180							0.0
						TOTAL =	0.0

TOTAL ANNUAL TIME(HOURS) & WATER (GALS) WASTED DUE TO WAITING FOR HOT WATER

WAIT TIME (sec)	1st HW event		2nd HW event		3rd HW event		4th HW event		5th HW event		6th HW event		TOTAL WASTED	
	TIME (hrs)	WATER (gal)	TIME (hrs)	WATER (gal)	TIME (hrs)	WATER (gal)	TIME (hrs)	WATER (gal)	TIME (hrs)	WATER (gal)	TIME (hrs)	WATER (gal)	TIME (days)	WATER (gal)
15														
30														
45														
60														
75														
90														
105														
120														
135														
150														
165														
180														
												YEARLY GRAND TOTAL =	0.0	0

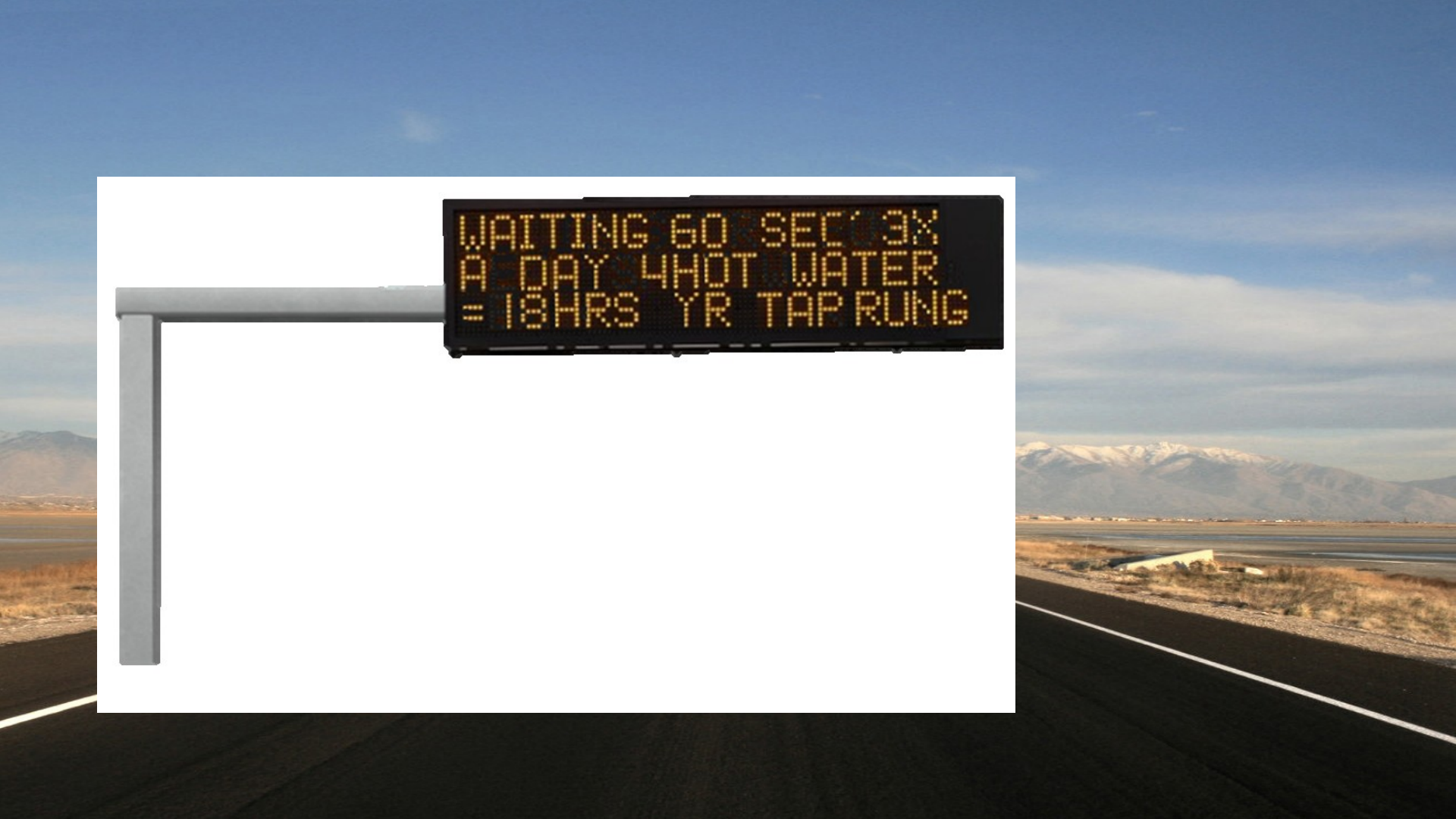
THE FOLLOWING SLIDES ARE SUGGESTIONS

WHICH SHOULD BRING ADDITIONAL AWARENESS TO DROUGHT EMERGENCY


SEVERE DROUGHT
LIMIT OUTDOOR
WATERING


SEVERE DROUGHT
STOP WAITING FOR
HOT WATER


WAITING 60 SECOND
A DAY 4HOT WATER
=6 HRS YR TAP RUNG


WAITING 60 SEC(3X
A DAY 4HOT WATER
= 18HRS YR TAP RUNG


WAITING 60 SEC(3X
A DAY 4HOT WATER
=2409 GAL WASTED YR