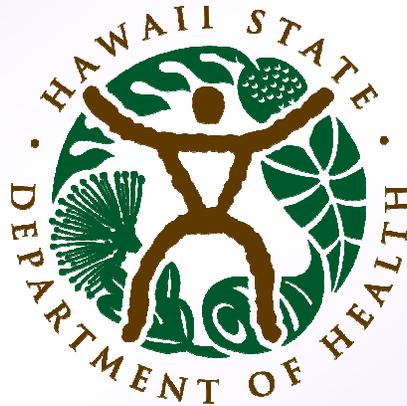


Water Reuse in the State of Hawaii



**Department of Health
Wastewater Branch
August 2014**

Topics

- **Reuse statewide**
- **Factors influencing Reuse**
- **Trends**
- **Challenges**
- **Clean Water State Revolving Fund**
- **Resource Plants & Onsite Use**

Reuse Statewide



- **WW generated – all wastewater (reuse quality or not), excluding WW from IWS's**
- **Reuse water produced**
- **Reused water consumed, actually used**



Compare:

wastewater reused

total wastewater generated



Oahu



Population: 983,429 – 70%

WW Generated: 110 mgd - 82%

9 county WWTPs

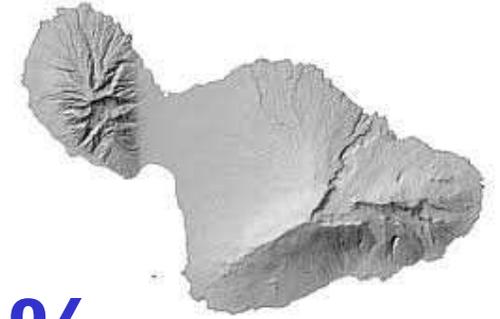
Honouliuli – provides greatest amount of reuse (8.3 mgd)

100% used

OAHU

WW Plant	WW Amount (mgd)	Reuse Produced (mgd)	% Reuse from WW	Reuse that is Used (mgd)	% Available Reuse Water Consumed	% Wastewater Actually Reused
Honouliuli	22.78	8.34	37%	8.34	100%	37%
Schofield	2.09	2.09	100%	2.09	100%	100%
Wahiawa	1.60	1.60	100%	1.60	100%	100%
Laie	0.55	0.55	100%	0.07	12%	12%
Turtle Bay Resort	0.21	0.21	100%	0.07	34%	34%
Kaneohe MCAB	1.00	0.30	30%	0.30	100%	30%
Waiawa	0.03	0.03	100%	0.03	100%	100%
Kunia	0.02	0.02	100%	0.02	100%	100%
Sand Island	60.00	0.00	0%	0.00	0%	0%
Kailua	11.50	0.00	0%	0.00	0%	0%
East Honolulu	3.91	0.00	0%	0.00	0%	0%
Waianae	3.30	0.00	0%	0.00	0%	0%
Paalaa Kai	2.40	0.00	0%	0.00	0%	0%
Waimanalo	0.54	0.00	0%	0.00	0%	0%
Kahuku	0.20	0.00	0%	0.00	0%	0%
Total	110	13.14	12%	12.52	95%	11%

Maui



Population: 160,000 – 11%

WW Generated: 14.4 mgd – 11%

**3 main county WW plants all
produce recycled water**



***Kaanapali Course
uses recycled
water from
Lahaina plant***

MAUI

WW Plant	WW Amount (mgd)	Reuse Produced (mgd)	% Reuse from WW	Reuse that is Used (mgd)	% Available Reuse Water Consumed	% Wastewater Actually Reused
Wailuku-Kahului	4.6	0.3	7%	0.3	100%	7%
Lahaina	3.9	3.9	100%	1.2	31%	31%
Kihei	3.6	1.6	44%	1.6	100%	44%
Makena	1.80	1.80	100%	1.80	100%	100%
Lanai Aux	0.25	0.25	100%	0.25	100%	100%
Pukulani	0.18	0.18	100%	0.18	100%	100%
Manele Bay	0.07	0.07	100%	0.07	100%	100%
Total	14.40	8.10	56%	5.40	67%	38%

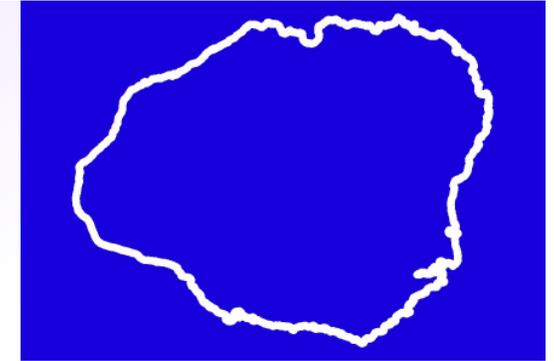
Kauai

Population: 70,000 – 5%

WW Generated: 3.7 mgd – 3%

(Oahu: 110 mgd)

**3 of 4 county plants produce
recycled water**



*Wailua Golf Course
& Lydgate Park
use recycled water
from Wailua plant*

KAUAI

WW Plant	WW Amount (mgd)	Reuse Produced (mgd)	% Reuse from WW	Reuse that is Used (mgd)	% Available Reuse Water Consumed	% Wastewater Actually Reused
Lihue	0.99	0.56	56%	0.56	100%	56%
Wailua	0.63	0.41	64%	0.41	100%	64%
Waimea	0.17	0.13	76%	0.13	100%	76%
Princeville	0.67	0.67	100%	0.50	75%	75%
Poipu WWRF	0.48	0.48	100%	0.48	100%	100%
Lihue-Puhi	0.35	0.35	100%	0.35	100%	100%
Hyatt Regency	0.11	0.11	100%	0.11	100%	100%
Eleele	0.30	-	0%	-	-	-
Total	3.70	2.70	73%	2.53	94%	68%

Hawaii



Population: 190,000 – 14%
Treated WW: 5.6 mgd – 4%
(excludes IWS's)

6 county WWTPs

Most reuse done by resorts

Planned County Reuse Projects:

- **First reuse plant at Kealakehe WWTP**
- **N Kona reuse distribution line**

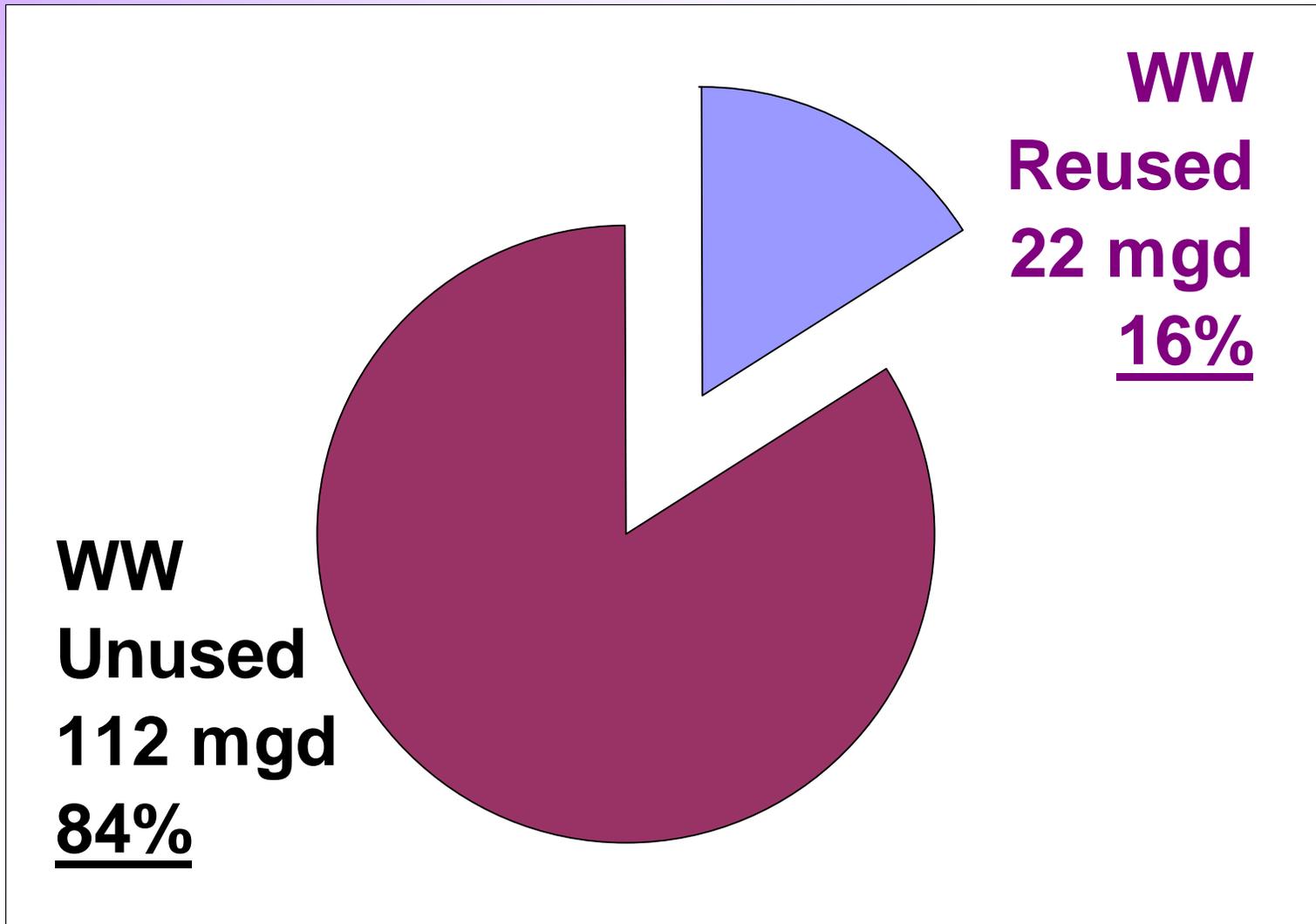
HAWAII ISLAND

WW Plant	WW Amount (mgd)	Reuse Produced (mgd)	% Reuse from WW	Reuse that is Used (mgd)	% Available Reuse Water Consumed	% Wastewater Actually Reused
Waikoloa Resort	0.50	0.50	100%	0.40	80%	80%
Heeia	0.35	0.35	100%	0.35	100%	100%
South Kohala	0.19	0.19	100%	0.19	100%	100%
Parker Ranch	0.06	0.06	100%	0.06	100%	100%
Kalahuipua'a Lgns	0.35	0.35	100%	0.35	100%	100%
Hilo	2.200	-	-	-	-	-
Kealakehe	1.740	-	-	-	-	-
Honokaa	0.056	-	-	-	-	-
Papaikou	0.090	-	-	-	-	-
Kulaimano	0.090	-	-	-	-	-
Kapehu	0.007	-	-	-	-	-
Total	5.6	1.45	26%	1.35	93%	24%

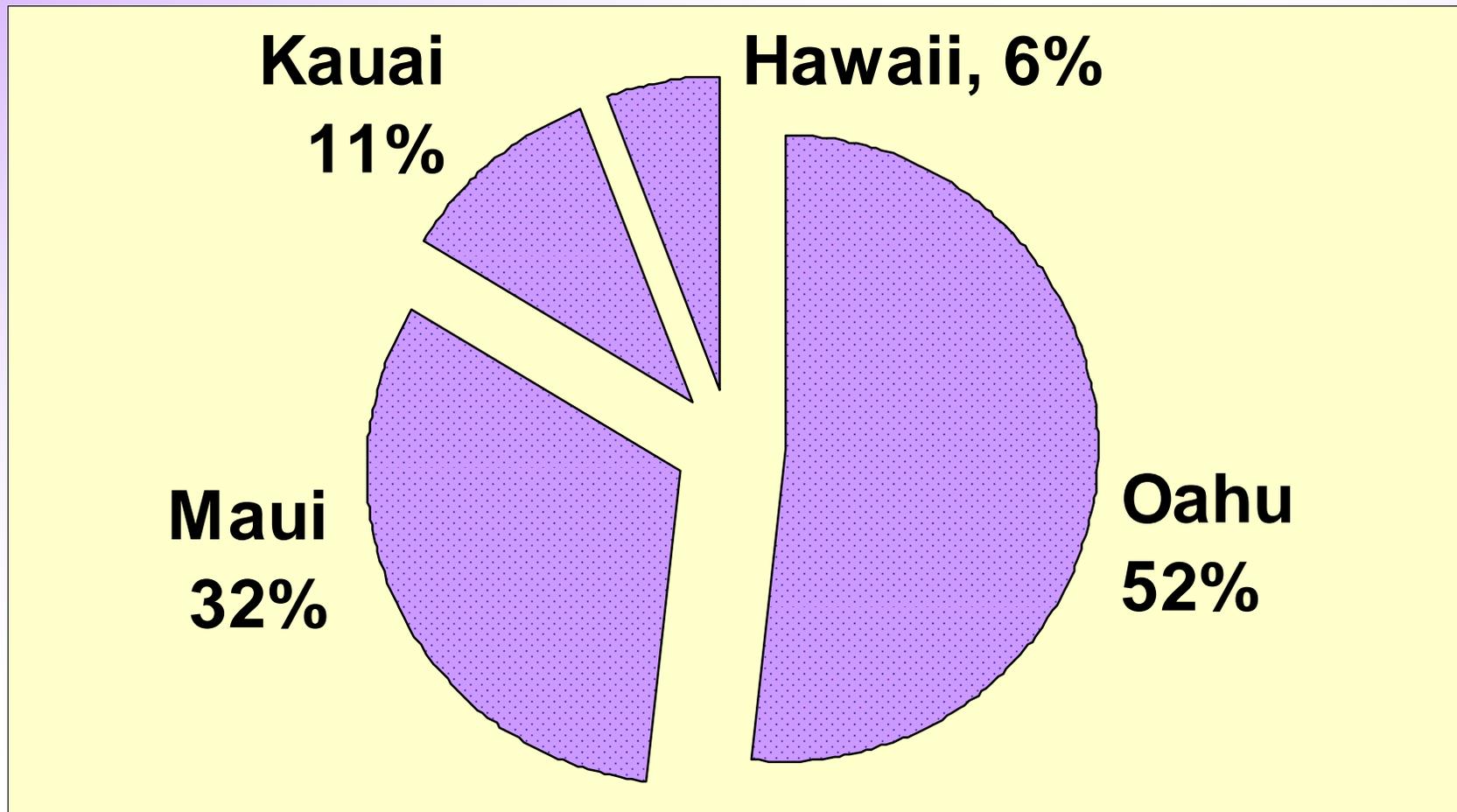
Statewide Wastewater Reuse - 2013

Island	WW Amount (mgd)	Reuse Produced (mgd)	% Reuse Produced from WW	Reuse Used (mgd)	% Available Reuse Consumed	% WW Actually Reused
Oahu	110.1	13.1	12%	12.5	95%	11%
Maui	14.4	8.1	56%	5.4	67%	38%
Kauai	3.7	2.7	73%	2.5	94%	68%
Hawaii	5.6	1.5	26%	1.4	93%	24%
TOTAL	134	25	19%	22	86%	16%

% of Water Reused - 2013

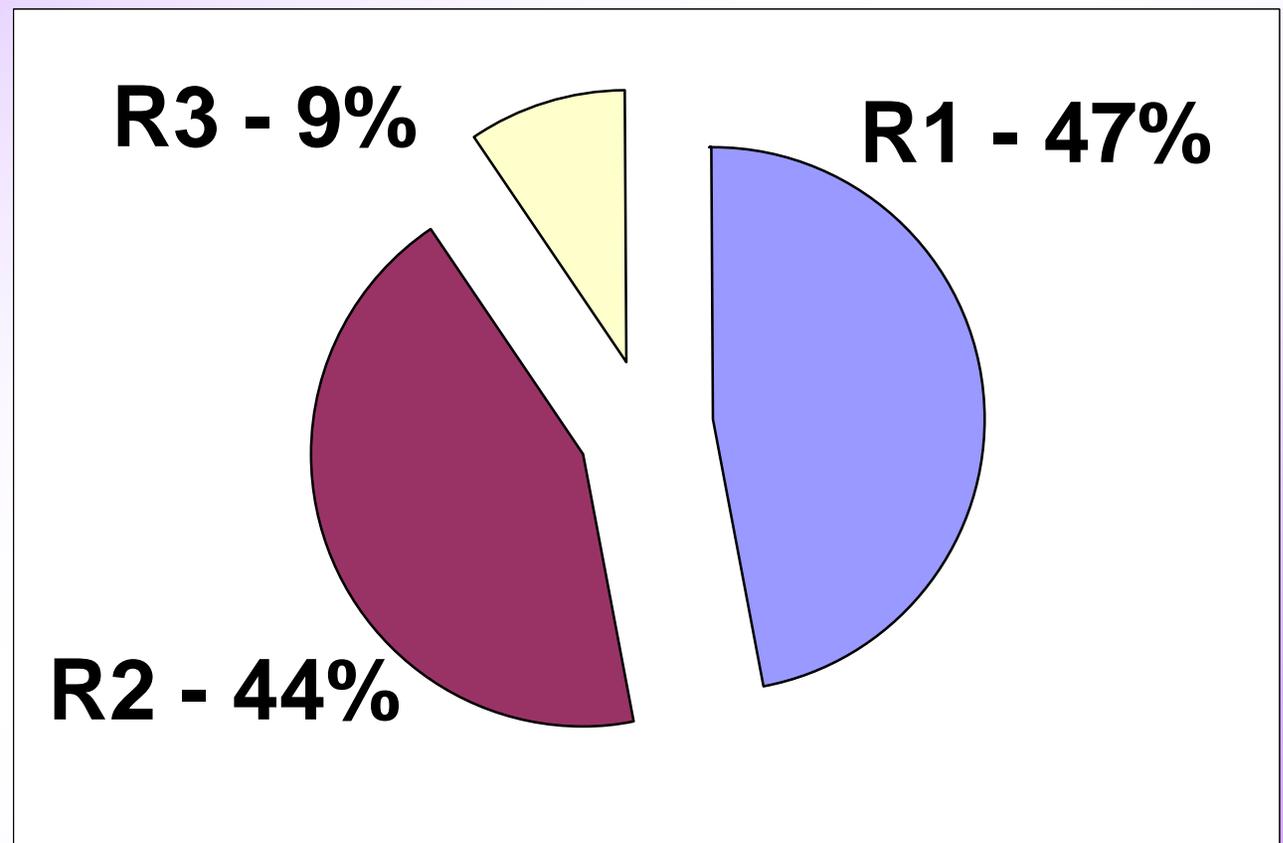


% Total Reuse Produced by Island



Types of Reuse Facilities

Type	No.
R-1	15
R-2	14
R-3	3
Total	32



R-1 is the highest quality reuse water.

Factors

Influencing

Reuse



Factors



- **Cost of Equipment & Distribution System**
- **Available Land for Equipment & Distribution**
- **Plant Proximity to Reuse Area**
- **Supply/demand & cost of recycled water**

Factors

- **Rainfall – heavy rains lower demand**
- **Economy/Development**
- **Military & Tourist Populations**
- **Public Perception**
- **Pharmaceuticals**

Reuse Trends



State Reuse Trend

1993 – present

Range:

- 20 - 23 mgd
- 13% – 16%

Trends

No significant increase in water reuse over the years.

However, many facilities have upgraded reuse quality from R-2 to R-1.

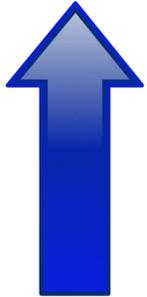
To significantly  water reuse:

Involve 3 largest plants:

- Sand Island, Honouliuli & Kailua treat **63%** of state's wastewater.

Challenges:

- **Cost prohibitive since SI secondary already at \$5 billion**
- **High chloride levels due to ocean proximity & infiltration/inflow**

To significantly  water reuse:

Onsite Resource Plants

Tap into large WWTPS

before or after WWTP

**aka “sewer mining” or
“scalping”**



Water Reuse Challenges

Challenges



- ❖ **Public Perception**
- ❖ **Pharmaceuticals & Personal Care Products (PPCPs) such as mouthwash, household cleansers, etc.**
- ❖ **Regulations**
- ❖ **High cost of Water Reuse**

Public Perception



- ❖ **Landscape irrigation – less resistance**
- ❖ **Safety concerns regarding exposure**
- ❖ **Concern with edible crop use. Hawaii farmers resistant to using reuse water on edible crops because of this.**

Public Perception

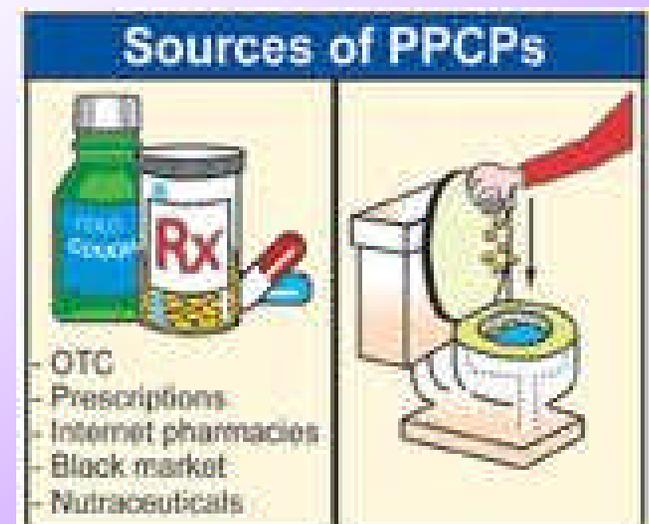
- ❖ **Residents may be unaware that they're already consuming produce from CA irrigated with R-1 water. (lettuce, celery, strawberries, spinach)**
- ❖ **Public education needed. As water supplies decrease, water reuse necessary to meet future water needs.**

Pharmaceuticals & Personal Care Products – What's being done?

- Test reuse water for PPCPs using the Dept's new lab technology.
- Develop leachability model to study impact on groundwater.

Study Participants:

- Safe Drinking Water Branch
- State Lab Division
- University of Hawaii



Another PPCP Study

Potential impact on Waialua's water aquifer on Oahu.

Joint study by: NOAA, CCH BWS, and Castle & Cooke.

Findings may affect future regulation of reuse water.



Regulations



- ❖ Future regulations may hinder reuse & meeting water conservation goals.
- ❖ Reuse projects must comply with DOH Water Reuse Guidelines (2002).
- ❖ DOH currently working with stakeholders to revise the Guidelines to streamline application process while still maintaining public safety. Targeted completion is end of year.

**Again, high cost
of Water Reuse**



What to do???

**Use Clean Water State
Revolving Fund (CWSRF)
for reuse projects.**

Clean



Water State

Revolving Fund



Clean Water
State Revolving Fund

**Supports wastewater projects
via low interest loans.**

Current loan rate: 1%

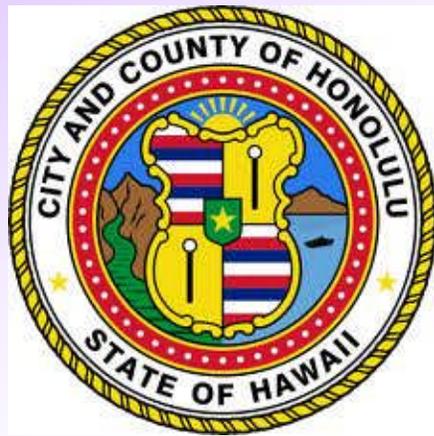
Participants: 4 counties

CWSRF "Infrastructure Bank"

Federal Grant



20% State Match



Loans



STATE REVOLVING FUND

Repay at 1% interest



Reuse Projects funded by CWSRF



Water reuse projects are of high priority.

- Plant upgrades to recycle water
- Recycled water distribution systems



Waimea WWTP Expansion & Upgrade to R-1 ~ \$17 million



Lahaina WWTP UV Expansion

Install 2 UV channels to increase
R-1 capacity from 3 to 9 mgd

~ \$3 of 6 million funded by SRF



Onsite

Resource

Plants



Onsite resource plants tap into a wastewater system (before or after a WWTP); aka “sewer mining” or “scalping.”

Plant extracts & treats sewage for reuse.

Recycled water uses:

- **Landscape irrigation (golf courses & parks).**
- **Boiler feed water for industry**
- **Cooling tower make-up water**
- **Toilet flushing**

Benefits of Resource Plants

- ❖ Reduces loan on WW plants**
- ❖ Decreases cost of water & wastewater infrastructure**
- ❖ Reduces energy needs**
- ❖ Conserves potable water**

Resource Plant Project:

- In 2004, Sydney, Australia water reservoir levels hit record lows.**
- Golf course asked to tap into a public sewer line that was running through it.**
- Sewage was treated to entire 57 acres of the golf course.**

Pennant Hills GC Resource Plant Project



- **Membrane Bioreactor & UV Disinfection**
- **Design capacity: 264,000 gpd**

Possible Resource Project in Hawaii:

**Install decentralized R-1 plant in
Waikiki.**

**Use treated effluent to irrigate Ala
Wai Golf Course, Kapiolani Park, &
zoo.**



Ala Wai Golf Course – 121 acres

Kapiolani Park – 300 acres

Honolulu Zoo – 42 acres

Install onsite system for Hawaii office & condominium towers?

- ❖ Install in parking lot or basement.**
- ❖ Use for cooling tower make-up water, toilet flushing & landscape irrigation.**

**Onsite Resource System
29-story skyscraper
Sydney, Australia**

26,000 GPD

**Basement sewage plant
Recycles 90% of bldg's
wastewater**

1 Bligh Street Tower Sydney, Australia

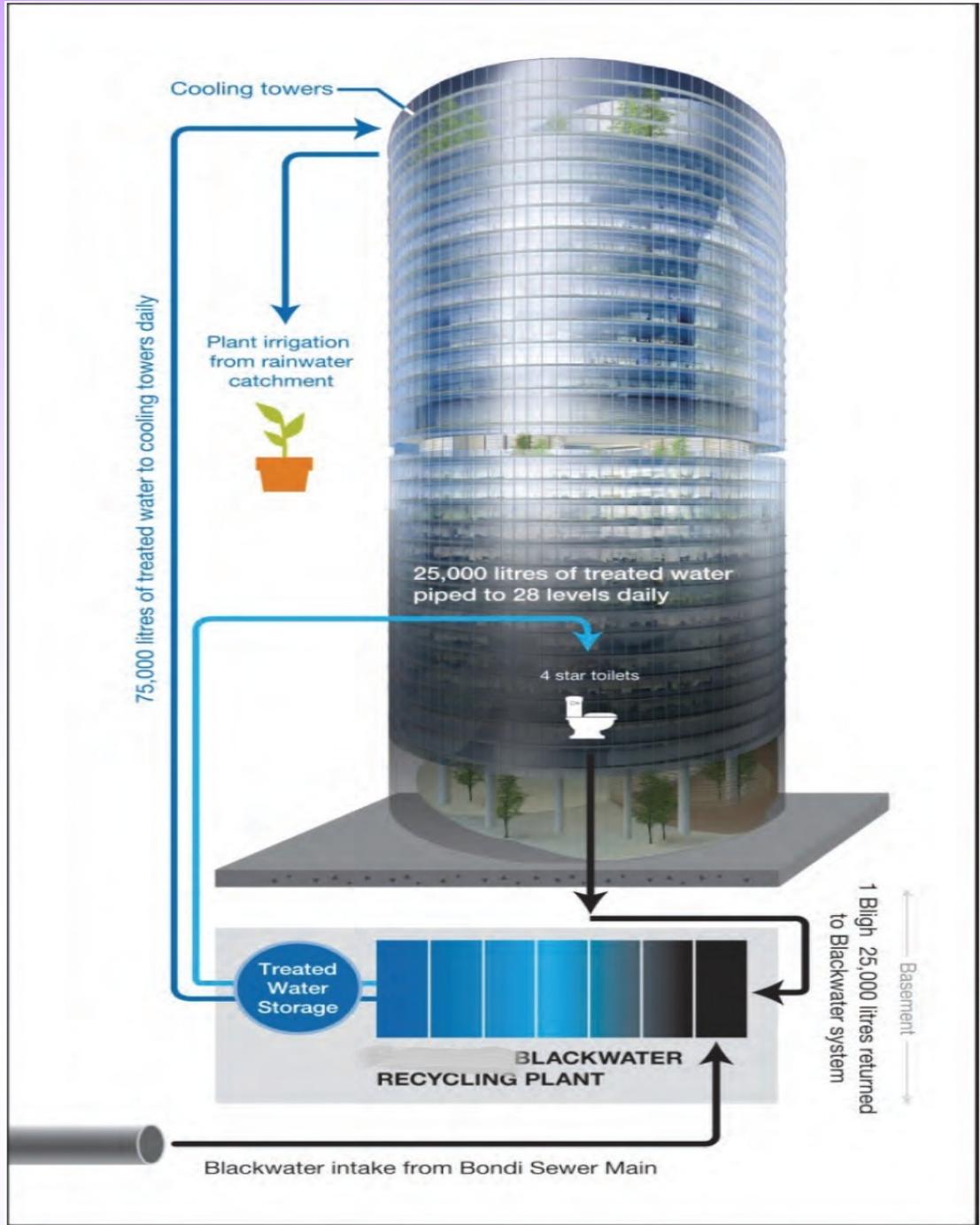


26,000 GPD Plant

Membrane Bioreactor

Ultra filtration (0.04 micron)

UV & Chlorine, R.O.



Intake from sewer main

26,400 gal recycled:

- **19,800 gal (75%) - cooling towers**
- **6,600 gal (25%) - flush toilets**

**Plant irrigation from rain
catchment**

Hawaii

Possibilities



Kaka`ako Redevelopment Resource Plant Possibilities

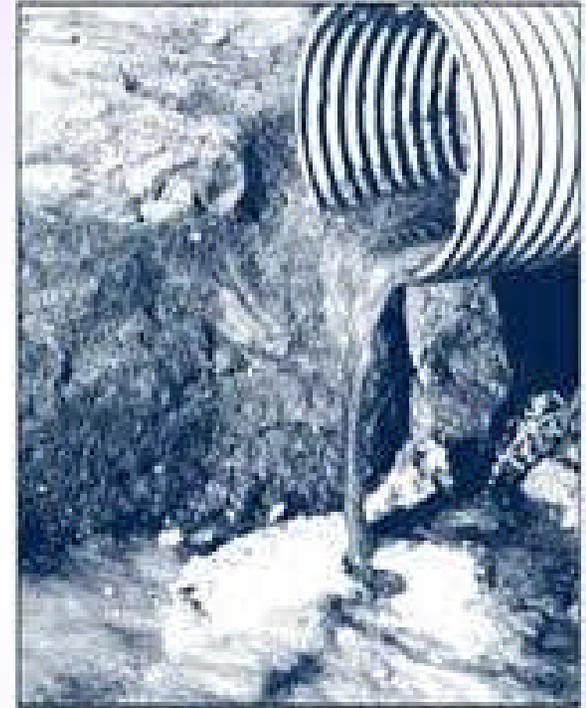


Onsite Resource Plant for Kaka`ako Towers



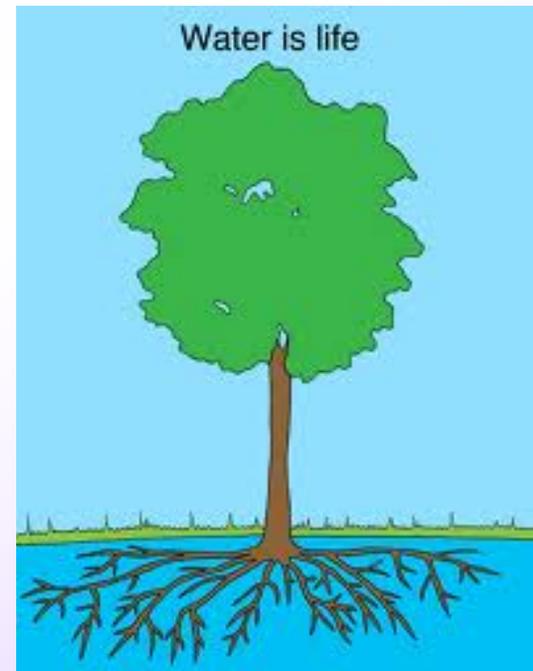


Closing Notes



**There is no such thing
as wastewater; just a
water resource being
wasted.**

**If water is life --
then water
conservation &
reuse must be a
way of life.**



Contact Information

**Department of Health
Environmental Management Division
Wastewater Branch**

Telephone: 586-4294

**Recycled Water Engineer: April Matsumura
Email: april.matsumura@doh.hawaii.gov**

Website: <http://health.hawaii.gov/wastewater/>