

County of Maui Recycled Water System



**County of Maui
Department of Environmental Management
August 13, 2014**

Maui Recycled Water System



What shall we do with treated
wastewater effluent?



Treated Effluent Disposal Options

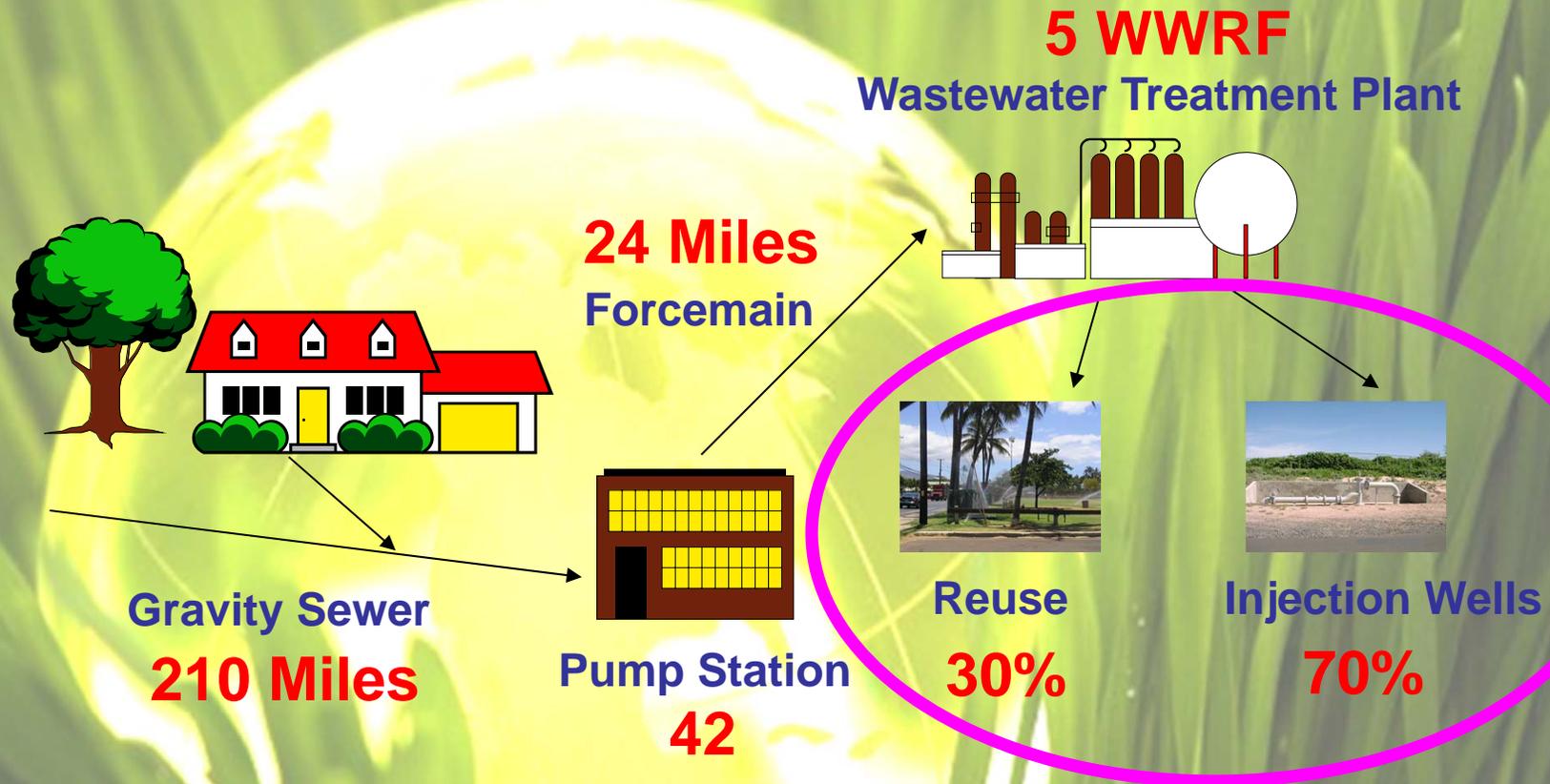
- **Ocean Outfalls**
- **Injection Wells**
- **R-1 Recycled Water – primarily irrigation**
- **Direct Potable Reuse**
- **Indirect Potable Reuse**

Each option presents its own challenges.

Maui Recycled Water System



Maui County Wastewater System



There are two effluent disposal options.



Recycled Water Development

- **Early 1990s – Recycled water feasibility studies**
- **Mid 1990s – Two WWRFs upgraded to R-1**
- **Late 1990s/Mid 2000s – Develop transmission system**
- **Mid 2000s/Present – Expand transmission system**

Maui County has committed to funding reuse.

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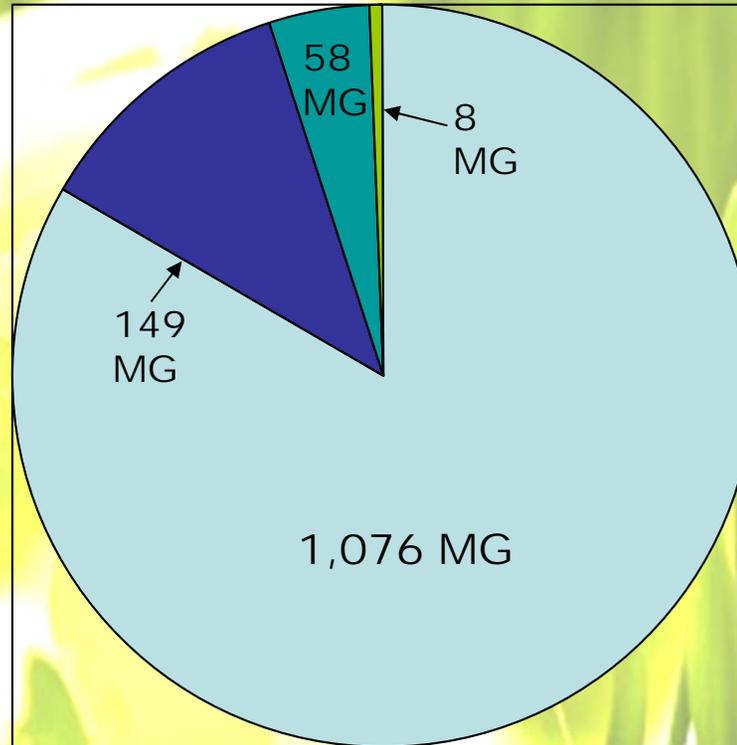
Facility Information

Facility	Design Flow (mgd)	Avg. Flow (mgd)	Avg. Reuse (mgd)	Peak Reuse (mgd)	Avg. % Reuse
Kihei (R-1)	8.0	3.34	1.65	1.95	49
Lahaina (R-1)	9.0	3.82	1.41	1.80	37
Wai-Kah (R-2)	7.9	3.85	0.16	0.17	4.3
Molokai (R-2)	0.3	0.16	0.08	0.01	4.9
Lanai (R-1)	0.5	0.30	0.30	0.35	100
TOTALS	25.7	11.47	3.53	4.28	30

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Reuse by Category



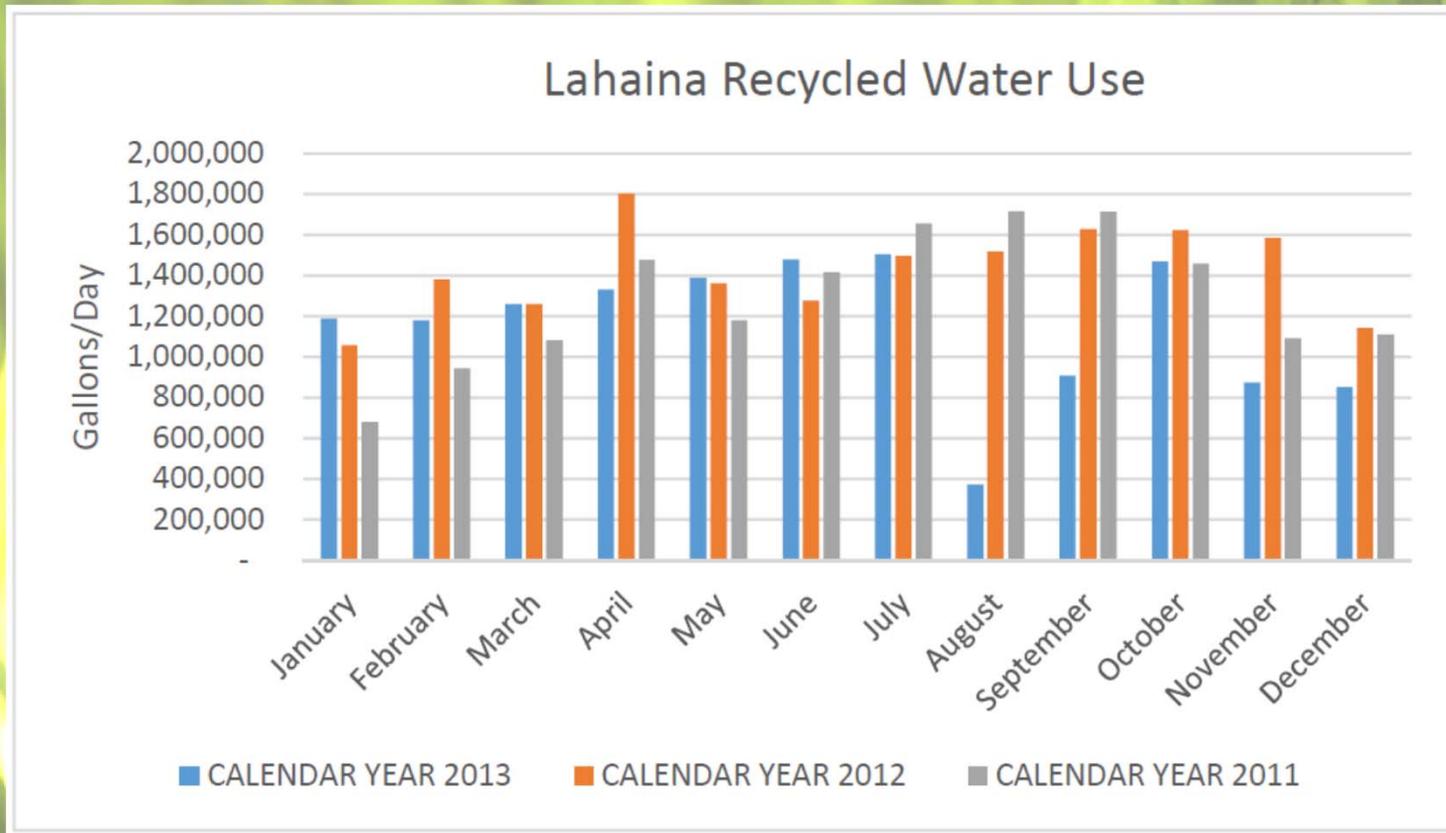
- Lands. Irrigation
- Industrial Use
- Agricultural Use
- Construction Use

Irrigation accounts for ~88% of use.

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Lahaina Recycled Water System

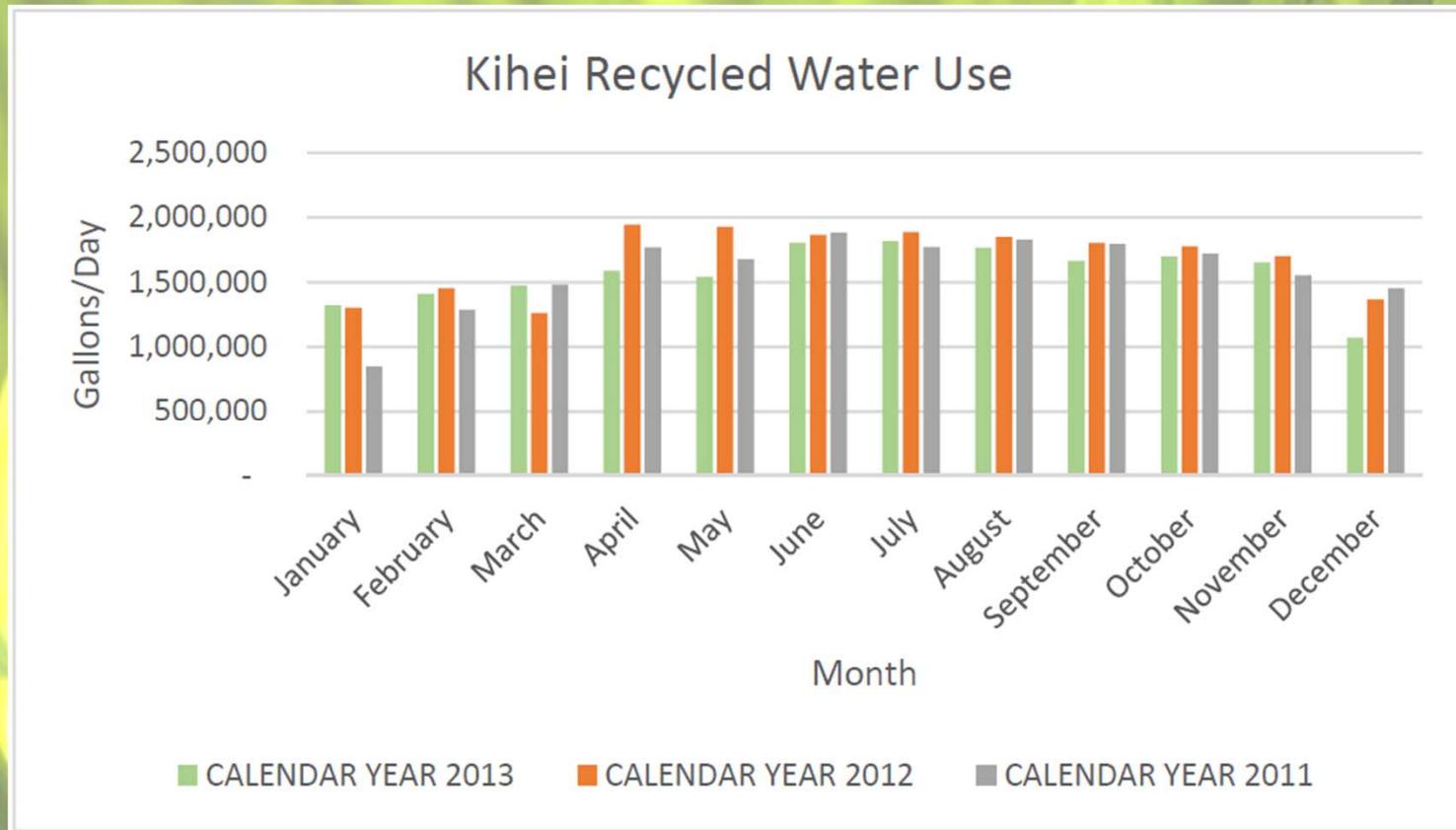


Usage drops significantly during the winter.

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Kihei Recycled Water System



Uneven demand hinders this as primary option.



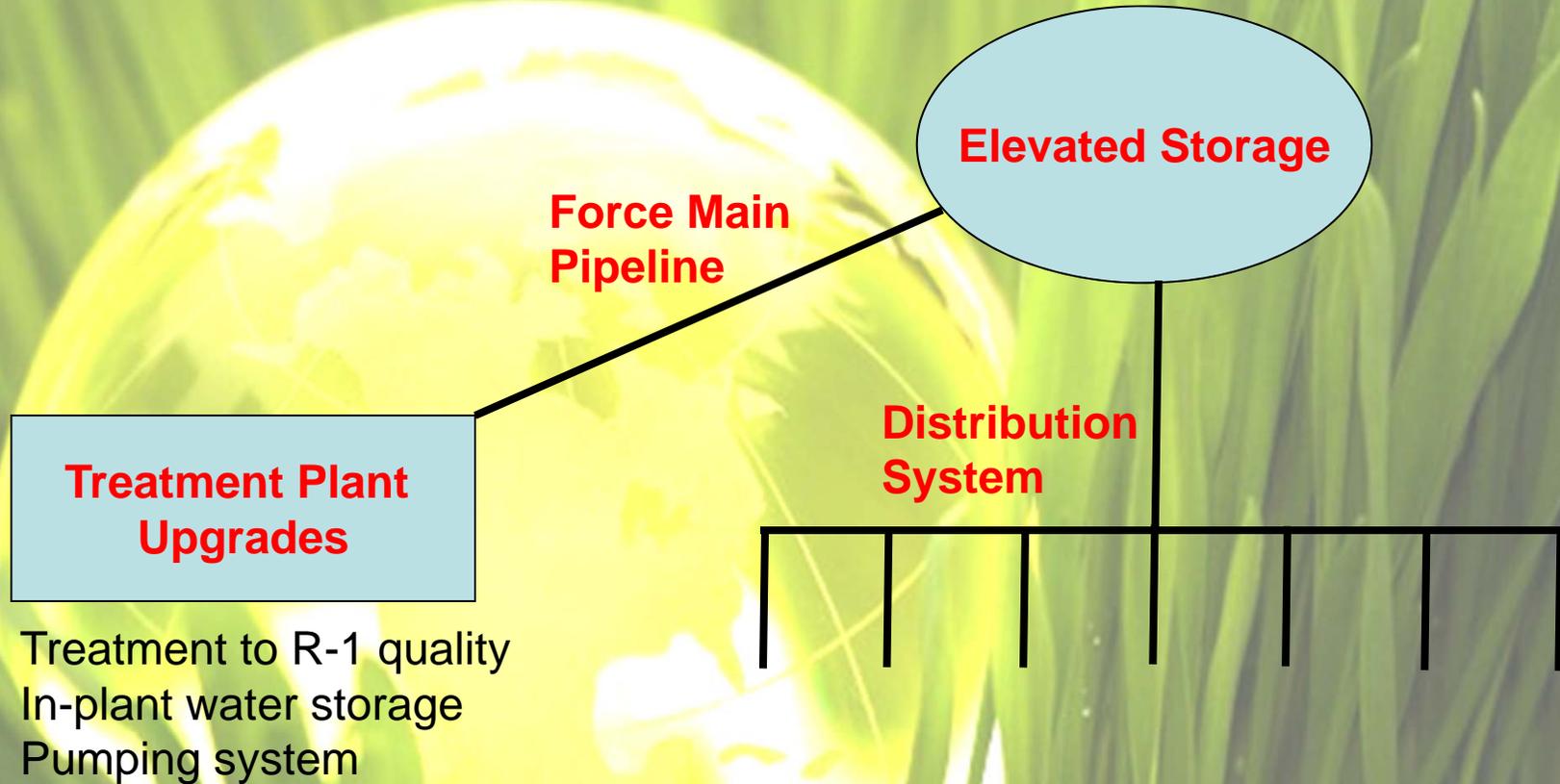
Maui County Rate Structure

- **Rates**
 - Major Agriculture: \$0.15 per 1,000 gallons
 - Agriculture (eg. golf courses): \$0.33 per 1,000 gallons
 - All Others: \$1.28 per 1,000 gallons
 - Avoided Cost: Match rate of available non-potable water source
 - Full Cost Recovery: ~\$2.50 per 1,000 gallons
 - WWRD philosophy has been sewer user fees subsidize water reuse program
- **Connection Fees (\$82/1,000 gallons used)**

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Recycled Water Infrastructure



Recycled water use comes at a cost.



Recycled Water Demand

- **Initially, large potential demand was from agricultural plantations**
- **Currently, demand is development based**
 - **Projected development booms have not been realized**
 - **Potential users are not necessarily close to resources**
 - **Demand has been driven by large subsidy for usage**

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Cost to Develop R-1 Infrastructure

- **Treatment facility improvements for R-1**
 - For 4.0 MGD capacity: ~\$18 million
- **Elevated storage for R-1**
 - For 1.0 MG capacity: ~\$6 million
- **Pipeline installation for R-1**
 - Depending on terrain: ~\$500-\$1,000 per foot
- **Pumping cost for R-1**
 - For 4.0 MGD: ~\$250,000 per year



Competing Priorities for Funds

- **Replacement of aging infrastructure**
 - Five treatment facilities
 - 42 pump stations
 - 210 miles of gravity sewer line
 - 24 miles of force main line
- **Recycled water system expansions are competing for the same funds**

System reliability remains the top priority.



Natural Resource Protection

- Central Maui – 95% ground, 5% surface
 - Upcountry – 79% surface
 - Lahaina – 60% surface
- Water is filtered and disinfected
- Maui water is relatively cheap
 - \$4.28/1,000 gallons from the tap
 - \$1,350/1,000 gallons from 16.9 ounce bottles

Why not consider wastewater for drinking?



Direct Potable Reuse

- Treated effluent directly undergoes additional treatment prior to consumption
 - No environmental buffer
- “Toilet to tap” – public stigma
 - Yuck factor, perceived health risks
- Example: Wichita Falls, Texas
 - Extended extreme drought conditions

Severe drought conditions → DPR rumblings.



Indirect Potable Reuse

- Treated effluent resides in another area before water treatment
 - Ground water recharge (ponds/injection wells)
 - Surface water facilities (reservoirs)
- Greater public acceptance than direct potable
- Examples: Singapore, Orange County, CA

Increased costs versus DPR, greater acceptance

Singapore Example

- “Four National Taps”
 - Malaysian river water
 - Desalination
 - Catchment
 - Wastewater reuse
 - Indirect potable reuse
 - Ultra treated effluent into reservoirs
 - Water treatment of reservoir water



Singapore’s goal is water independence .

Summary

- The County of Maui will continue to expand its recycled water systems
- The County is exploring alternatives to existing treated effluent options
- WWRD will continue to work with DWS towards increased treated effluent use



Effective effluent reuse preserves resources.